J.N.N INSTITUTE OF ENGINEERING

AUTONOMOUS

NAAC 'A' Grade | Approved by AICTE | Affiliated to Anna University

ACADEMIC CURRICULUM
(REGULATION 2022)
FOR

UNDER GRADUATE
PROGRAMMESCHOICE BASED
CREDIT SYSTEM
(Applicable to the students admitted from the Academic Year 2022 – 2023 onwards)

B.E – COMPUTER SCIENCE AND ENGINEERING

B.E. COMPUTER SCIENCE AND ENGINEERING

ABOUT THE DEPARTMENT

Department of Computer Science and Engineering has been established in the year 2008with intake of 90 students and the aim of emerging as realm of per-eminence that empowers the students to reach the zenith, as assertive.

IT professionals by offering quality technical education and research environment to best serve the nation. Computer Science is the scientific and practical approach to computation and its applications. It is a systematic study of the feasibility, structure, expression and mechanization of the methodical processes (or algorithms) that underlie the acquisition,representation, processing, storage, communication of, and access to information, whether such information is encoded in bits and bytes in a computer memory.

A computer scientist specializes in the theory of computation and the design of computational systems. The department runs with the aim of emerging as a realm of pre-eminence that empowers the students to reach the zenith, as assertive IT professionals by offering quality technical education and research environment to best serve the nation.

VISION

To produce globally competent, quality computer professionals and toinculcate the spiritof moral values for the cause of development of our nation

MISSION

1. Establish closer and symbolic relationship with IT industries and expose the students to the cutting edge technological advancements

2. Provide impetus and importance to beyond curriculum learning and thereby provide an opportunity for the student community to keep them updated with latest and socially relevant technology

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

Bachelor of Computer Science and Engineering curriculum is designed to prepare thegraduates having attitude and knowledge to

1. Apply their technical competence in computer science to solve real world

problems, with technical and people leadership.

2. Conduct cutting edge research and develop solutions on problems of social relevance.
3. Work in a business environment, exhibiting team skills, work ethics,adaptability andlifelong learning.

PROGRAM OUTCOMES POs:

Engineering Graduates will be able to:

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 engineeringsolutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities andnorms 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 withthe 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 andreceive 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 andleader 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.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

1. Exhibit design and programming skills to build and automate business solutions usingcutting edge technologies.
2. Strong theoretical foundation leading to excellence and excitement towards research,to provide elegant solutions to complex problems.
3. Ability to work effectively with various engineering fields as a team to design, buildand develop system applications.

CHOICE BASED CERDIT SYSTEM
B.E. COMPUTER SCIENCE AND ENIGNEERINGCURRICULUM FOR SEMESTERS I TO VIII
ANDSYLLABI FOR SEMESTERS I TO IV

SEMESTER I

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
MANDATORY COURSE										
*	22IP100	Induction Programme	-	-	-	-	-	03 Weeks	0	-
THEORY COURSES										
1	22HST101	Professional English	L+P	2	0	4	0	6	4	HSMC
2	22BST101	Basic Mathematics for Engineers	L	3	2	0	0	5	4	BSC
3	22BST102	Engineering Physics	L	3	0	0	0	3	3	BSC
4	22BST103	Engineering Chemistry	L	3	0	0	0	3	3	BSC
5	22EST101	Problem Solving and Python Programming	L	3	0	0	0	3	3	ESC
6	22HSM101	Heritage Of Tamils	L	1	0	0	0	1	1	HSMC
EMPLOYABILITY ENHANCEMENT COURSE										
7	22EET101	Engineering and Professional Skills	L+P	1	0	2	0	3	2	HSMC
PRACTICAL COURSES										
8	22ESP101	Problem Solving and Python Programming Laboratory	P	0	0	4	0	4	2	ESC
9	22BSP101	Physics and Chemistry Laboratory	P	0	0	4	0	4	2	BSC
EMPLOYABILITY ENHANCEMENT COURSE										
10	22EEP101	Product Tinkering Laboratory	P	0	0	2	0	2	1	EEC
			TOTAL	**16**	**02**	**16**	**00**	**33**	**25**	

L-Theory, T-Tutorial, P-Practical, J-Project TCP-Total Credit PeriodC-Credit CAT- CATEGORY

SEMESTER II

S.No	COURS ECODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1		Language Elective	T+P	3	0	2	0	5	4	HSMC
2	22BST201	Statistics and Transforms	T	3	2	0	0	5	4	BSC
3	22BST204	Physics for Information Science	T	3	0	0	0	3	3	BSC
4	22CST201	Object Oriented Programming	L+P	2	0	2	0	4	3	PCC
5	22EST205	Basic Electrical and Electronics Engineering	T	3	0	0	0	3	3	ESC
6	22EST202	Engineering Graphics	L+P	1	0	4	0	5	3	ESC
7	22HSM201	Tamils and Technology	T	1	0	0	0	1	1	HSMC
EMPLOYABILITY ENHANCEMENT COURSE										
8	22EET201	Innovation and Design Thinking	T	2	0	0	0	2	2	EEC
MANDATORY COURSE										
9		NCC/NSS/YRC Credit Course Level- I	-	1	0	0	0	1	1#	-
PRACTICAL COURSES										
10	22ESP201	Engineering Product Laboratory	P	0	0	3	0	3	1.5	ESC
11	22ESP203	Basic Electrical and Electronics Engineering Laboratory	P	0	0	3	0	3	1.5	ESC
TOTAL				19	02	14	00	35	26	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Period
C- Credits CAT- Category

 # NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will berecorded in the Mark Sheet, however the same shall not be considered for the computationof CGPA.

SEMESTER III

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22CST301	System Software	L	3	0	0	0	3	3	PCC
2	22CST302	Programming in Java	L+P	3	0	2	0	5	4	PCC
3	22CST303	Database Management Systems	L	3	0	0	0	3	3	PCC
4	22CST304	Data Structures	L	3	0	0	0	3	3	PCC
5	22HST301	Entrepreneurship and startups*	L	3	0	0	0	3	2	HSMC
PRACTICAL COURSES										
6	22CSP301	Data Structures Laboratory	P	0	0	4	0	4	2	PCC
7	22CSP302	Database Management Systems Laboratory	P	0	0	4	0	4	2	PCC
EMPLOYABILITY ENHANCEMENT COURSE										
8	22EEP301	Soft Skills*	P	0	0	2	0	2	1	EEC
			TOTAL	**18**	**0**	**12**	**00**	**27**	**20**	

***Common to all Branches**

L-Theory, T-Tutorial, P-Practical, J-Project TCP-Total Credit Period
C-Credit CAT- CATEGORY

SEMESTER IV

S.No	COURS ECODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22BST401	Discrete Mathematics	L+T	3	2	0	0	5	4	BSC
2	22CST401	Foundations of Data Science	L	3	0	0	0	3	3	PCC
3	22CST402	Introduction to Operating Systems	L	3	0	0	0	3	3	PCC
4	22CST403	Software Engineering	L+P	2	0	2	0	4	3	PCC
5	22EST401	Environmental Sciences and Sustainability	L	2	0	0	0	2	2	BSC
MANDATORY COURSE										
6		NCC/NSS/YRC Credit Course Level-II	-	1	0	0	0	1	1#	-
PRACTICAL COURSES										
7	22CSP401	Data Science Laboratory	P	0	0	3	0	3	1.5	PCC
8	22CSP402	Operating Systems Laboratory	P	0	0	3	0	3	1.5	PCC
EMPLOYABILITY ENHANCEMENT COURSE										
9	22EEP401	Quantitative Analysis and Logical Reasoning-I	P	0	0	2	0	2	1	EEC
			TOTAL	**14**	**02**	**09**	**00**	**25**	**19**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**

SEMESTER V

S.No	COURS ECODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22CST501	Distributed Computing	L+P	3	0	2	0	5	4	PCC
2	22CST502	Big Data Analytics	L	3	0	0	0	3	3	PCC
3	22CST503	Advanced Web Programming	L	3	0	0	0	3	3	PCC
4	22CST504	Theory of Computation	L	4	0	0	0	4	4	PCC
EMPLOYABILITY ENHANCEMENT COURSE										
5	22EET501	Engineering Economics and Financial Management	L	3	0	0	0	3	3	EEC
MANDATORY COURSE										
6		Mandatory Course - I	L	3	0	0	0	3	0	MCC
ENROLLMENT FOR B.E. / B. TECH. (HONORS) / MINOR DEGREE (OPTIONAL)										
7		Minor/Honor/RemedialClass **	L	3	0	0	0	3	3**	PEC**
PRACTICAL COURSES										
8	22CSP501	Big Data Analytics Laboratory	P	0	0	4	0	4	2	PCC
9	22CSP502	Web Technologies Laboratory	P	0	0	4	0	4	2	PCC
EMPLOYABILITY ENHANCEMENT COURSE										
10	22EEP502	Internship*	P	0	0	0	0	0	1	EEC
			TOTAL	**22**	**00**	**10**	**00**	**32**	**22**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**

SEMESTER VI

S.No	COURSECODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22CST601	Network Security	L	3	0	0	0	3	3	PCC
2	22CST602	Internet of Things	L+J	3	0	0	2	5	4	PCC
OPEN ELECTIVE										
3		Open Elective-I	L	3	0	0	0	3	3	OEC
PROFESSIONAL ELECTIVE										
4		Professional Elective –I	L	2	0	2	0	4	3	PEC
5		Professional Elective – II	L	2	0	2	0	4	3	PEC
MANDATORY COURSE										
6		Mandatory Course - II	L	3	0	0	0	3	0	MCC
7		NCC/NSS/YRC Credit Course Level- III	-	1	0	0	0	1	1#	-
ENROLLMENT FOR B.E. / B.TECH. (HONORS) / MINOR DEGREE (OPTIONAL)										
8		Minor/Honor/remedial class**		3	0	0	0	3	3**	PEC**
PRACTICAL COURSES - EMPLOYABILITY ENHANCEMENT COURSE										
9	22EEP601	Quantitative Analysis and Logical Reasoning-II	P	0	0	2	0	2	1	EEC
10	22EEP602	Comprehensive Assessment*	-	0	0	2	0	2	1	EEC
PRACTICAL COURSES										
11	22CSP601	Network Security Laboratory	P	0	0	4	0	4	2	PCC
			TOTAL	**20**	**00**	**12**	**02**	**34**	**20**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**

SEMESTER VII

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22CST701	Cloud Computing	L	3	0	0	0	3	3	PCC
OPEN ELECTIVE										
2		Open Elective-II	L	3	0	0	0	3	3	OEC
PROFESSIONAL ELECTIVE										
3		Professional Elective- III	L	2	0	2	0	4	3	PEC
4		Professional Elective- IV	L	2	0	2	0	4	3	PEC
5		Professional Elective- V	L	2	0	2	0	4	3	PEC
ENROLLMENT FOR B.E. / B.TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)										
6		Minor/Honor/remedial class **	T	3	0	0	0	3	3**	PEC**
PRACTICAL COURSES										
7	22CSP701	Cloud Computing Laboratory	P	0	0	4	0	4	2	PCC
PRACTICAL COURSES - EMPLOYABILITY ENHANCEMENT COURSE										
8	22EEP701	Product Design and Development*	J	0	0	0	4	4	2	EEC
9		Internship*	P	0	0	0	0	0	1	EEC
TOTAL				**18**	**00**	**10**	**04**	**29**	**20**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**

SEMESTER VIII

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES - PROFESSIONAL ELECTIVE										
1		Professional Elective-VI	L	2	0	2	0	4	3	PEC
ENROLLMENT FOR B.E. / B.TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)										
2		Minor/Honor/remedial class **	L	3	0	0	0	3	3**	PEC**
PRACTICAL COURSES - EMPLOYABILITY ENHANCEMENT COURSE										
3	22CSP801	Project Work	J	0	0	0	16	16	8	EEC
			TOTAL	**05**	**00**	**02**	**16**	**22**	**11**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category

**** Common to all branches, selection from one minor vertical/approved honors subjects**

CREDIT DISTRIBUTION

Semester	HSMC	BSC	ESC	PCC	PEC	OEC	EEC	MC	TOTAL	Total PER %
I	05	12	05	-	-	-	03	-	**25**	**15**
II	05	07	09	03	-	-	02	-	**26**	**16**
III	02	-	-	17	-	-	01	-	**20**	**12**
IV	-	06	-	12	-	-	01	-	**19**	**12**
V	-	-	-	18		-	04	-	**22**	**14**
VI	-	-	-	09	06	03	02	-	**20**	**12**
VII	-	-	-	05	09	03	03	-	**20**	**12**
VIII	-	-	-	-	03	-	08	-	**11**	**7**
TOTAL	**12**	**25**	**14**	**64**	**18**	**06**	**24**	**-**	**163**	**100**

CATEGORY		Breakup of Credits	PER % in Total
HSMC	Humanities & Social Science Including Management	**12**	**7**
BSC	Basic Science Courses	**25**	**15**
ESC	Engineering Science Courses	**14**	**9**
PCC	Professional Core Courses	**64**	**40**
PEC	Professional Elective Courses	**18**	**11**
OEC	Open Elective Courses	**06**	**4**
EEC	Employment Enhancement Courses	**24**	**15**
MCC	Mandatory Courses	-	-
	Total Credits	**162**	**100**

PROFESSIONAL ELECTIVES COURSES: VERTICALS

VERTICAL 1	VERTICAL2	VERTICAL 3	VERTICAL 6
DATA SCIENCE	**FULL STACK DEVELOPMENT**	**CYBER SECURITY AND DATA PRIVACY**	**EMERGING TECHNOLOGIES**
Exploratory DataAnalysis	Web Technologies	Ethical Hacking	Augmented Reality / Virtual Reality
RecommenderSystems	App Development	Digital And Mobile Forensics	Robotic Process Automation
Neural Networks and Deep Learning	Cloud ServicesManagement	Social NetworkSecurity	Neural Networks and Deep Learning
Text And SpeechAnalysis	UI And UXDesign	Modern Cryptography	Cyber Security
Business Analytics	Software Testing and Automation	Engineering Secure Software Systems	Quantum Computing
Image and Video Analytics	Web Application Security	Cryptocurrency and Block chainTechnologies	Compiler Design
Computer Vision	Devops	Network Security	Game Development
Big Data Analytics	Principles of Programming Languages	Security and Privacy In Cloud	Drone Technology

PROFESSIONAL ELECTIVES COURSES: VERTICALS

Professional Electives-I Data Science								
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1.	22PEDS01	Exploratory Data Analysis	2	0	2	0	4	3
2.	22PEDS02	Recommender Systems	2	0	2	0	4	3
3.	22PEDS03	Neural Networks and Deep Learning	2	0	2	0	4	3
4.	22PEDS04	Text and Speech Analysis	2	0	2	0	4	3
5.	22PEDS05	Business Analytics	2	0	2	0	4	3
6.	22PEDS06	Image and Video Analytics	2	0	2	0	4	3
7.	22PEDS07	Computer Vision	2	0	2	0	4	3
8.	22PEDS08	Big Data Analytics	2	0	2	0	4	3

Professional Electives-II Full Stack Development								
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22PEFS01	Web Technologies	2	0	2	0	4	3
2	22PEFS02	App Development	2	0	2	0	4	3
3	22PEFS03	Cloud Services Management	2	0	2	0	4	3
4	22PEFS04	UI and UX Design	2	0	2	0	4	3
5	22PEFS05	Software Testing and Automation	2	0	2	0	4	3
6	22PEFS06	Web Application Security	2	0	2	0	4	3
7	22PEFS07	DevOps	2	0	2	0	4	3
8	22PEFS08	Principles of Programming Languages	2	0	2	0	4	3

Professional Electives-III Cyber Security And Data Privacy								
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**ContactHours**	**Credits**
1	22PECY01	Ethical Hacking	2	0	2	0	4	3
2	22PECY02	Digital and Mobile Forensics	2	0	2	0	4	3
3	22PECY03	Social Network Security	2	0	2	0	4	3
4	22PECY04	Modern Cryptography	2	0	2	0	4	3
5	22PECY05	Engineering Secure Software Systems	2	0	2	0	4	3
6	22PECY06	Cryptocurrency and Block Chain Technologies	2	0	2	0	4	3
7	22PECY07	Network Security	2	0	2	0	4	3
8	22PECY08	Security and Privacy in Cloud	2	0	2	0	4	3

Professional Electives-IV Emerging Technologies								
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22PECC01	Augmented Reality / Virtual Reality	2	0	2	0	4	3
2	22PECC02	Robotic Process Automation	2	0	2	0	4	3
3	22PECC03	Neural Networks and Deep Learning	2	0	2	0	4	3
4	22PECC04	Cyber Security	2	0	2	0	4	3
5	22PECC05	Quantum Computing	3	0	0	0	3	3
6	22PECC06	Compiler Design	2	0	2	0	4	3
7	22PECC07	Game Development	2	0	2	0	4	3
8	22PECC08	Drone Technology	2	0	2	0	4	3

MANDATORY COURSES I
(Semester V)

S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22MCT001	Introduction to Women and Gender Studies	3	0	0	0	3	0
2	22 MCT002	Elements of Literature	3	0	0	0	3	0
3	22 MCT003	Film Appreciation	3	0	0	0	3	0
4	22MCT004	Well Being with Traditional Practices (Yoga, Ayurveda and Siddha)	3	0	0	0	3	0
5	22MCT006	Indian Constitution	3	0	0	0	3	0
6	22MCT007	Industrial Safety	3	0	0	0	3	0

MANDATORY COURSES II
(Semester VI)

S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22 MCT008	Essential of Indian Traditional Values	3	0	0	0	3	0
2	22 MCT009	History of Science and Technology in India	3	0	0	0	3	0
3	22MCT010	Political and Economic Thought for a Humane Society	3	0	0	0	3	0
4	22MCT011	State, Nation Building and Politics in India	3	0	0	0	3	0
5	22MCT012	Disaster Management	3	0	0	0	3	0

LANGUAGE ELECTIVE COURSES
(Semester II)

S.No	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22LET201	Technical English	2	0	2	0	4	3
2	22LET202	French Language	2	0	2	0	4	3
3	22LET203	German Language	2	0	2	0	4	3
4	22LET204	Japanese Language	2	0	2	0	4	3

OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similarto any other course contents/title under other course categories).

OPEN ELECTIVE I

S.No	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22RAO001	Robotics	3	0	0	0	3	3
2	22RAO002	Selection of Materials	3	0	0	0	3	3
3	22RAO003	Testing of Materials	3	0	0	0	3	3
4	22RAO004	Marine Vehicles	3	0	0	0	3	3
5	22RAO005	Introduction To Nanotechnology	3	0	0	0	3	3
6	22RAO006	Lean Manufacturing	3	0	0	0	3	3
7	22ADO001	Ethics in Data Science	2	0	2	0	4	3
8	22ADO002	Software Testing	2	0	2	0	4	3
9	22ADO003	Principles of Programming Language	2	0	2	0	4	3
10	22ADO004	Digital Marketing	2	0	2	0	4	3
11	22BMO001	Biology for Engineer	3	0	0	0	3	3
12	22BMO002	Basic of Biomedical Instrumentation	3	0	0	0	3	3
13	22BMO003	Basics of Bioinformatics	3	0	0	0	3	3
14	22BMO004	Biomedical Nanotechnology	3	0	0	0	3	3
15	22ECO001	Arduino for Engineers	3	0	0	0	3	3
16	22ECO002	Introduction to Embedded system	3	0	0	0	3	3
17	22ECO003	Space Time Wireless Communication	3	0	0	0	3	3
18	22ECO004	Telecommunication Network Management	3	0	0	0	3	3
19	22CSO001	System Software	3	0	0	0	3	3

20	22CSO002	Computer Graphics	3	0	0	0	3	3
21	22CSO003	Mobile Application Development	3	0	0	0	3	3

OPEN ELECTIVE II

S.No	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22RAO007	Fundamentals of Combustion	3	0	0	0	3	3
2	22RAO008	Basics in Manufacturing and Metal Cutting Process	3	0	0	0	3	3
3	22RAO009	Fundamentals of Planetary Remote Sensing	3	0	0	0	3	3
4	22RAO010	Lean Six Sigma	3	0	0	0	3	3
5	22RAO011	Low Cost Automation	3	0	0	0	3	3
6	22RAO012	Production of Automotive Components	3	0	0	0	3	3
7	22ADO005	Professional Ethics	2	0	2	0	4	3
8	22ADO006	Cloud Computing	2	0	2	0	4	3
9	22ADO007	Cloud Service Management	2	0	2	0	4	3
10	22ADO008	Operating System	2	0	2	0	4	3
11	22BMO005	Troubleshooting in Medical Devices	3	0	0	0	3	3
12	22BMO006	Quality Assurance and Safety in Hospitals	3	0	0	0	3	3
13	22BMO007	Medical Electronics	3	0	0	0	3	3
14	22BMO008	Assist Devices	3	0	0	0	3	3
15	22ECO005	Introduction to Industrial Engineering	3	0	0	0	3	3
16	22ECO006	Space Engineering	3	0	0	0	3	3
17	22ECO007	Wavelet and its Applications	3	0	0	0	3	3
18	22ECO008	Introduction to Control Systems	3	0	0	0	3	3
19	22CSO004	Ubiquitous Computing	3	0	0	0	3	3
20	22CSO005	User Interface Design	3	0	0	0	3	3
21	22CSO006	Multimedia Systems	3	0	0	0	3	3

ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester III onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester III onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

Course Code	Course Title	L	T	P	J	C
22HST101	PROFESSIONAL ENGLISH	2	0	4	0	4
		Syllabus version			v. 1.1	

COURSE OBJECTIVES:

The course enables the learner to

1. Improve communicative competence
2. Help use the language effectively in academic /work contexts
3. Build language skills by engaging in listening, speaking, vocabulary and grammar learning activities relevant to authentic contexts
4. Develop the ability to read and write complex texts, summaries, articles, blogs, definitions, essays, and user manuals.
5. Use language efficiently in expressing opinions via various media

COURSE OUTCOME:

After the completion of this course, the students should be able to

1. Listen and comprehend complex academic texts
2. Read and infer the denotative and connotative meanings of technical texts
3. Write definitions, descriptions, narrations, and essays on various topics
4. Speak fluently and accurately in formal and informal communicative contexts
5. Express their opinions effectively in both oral and written medium of communication

UNIT-1	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	6 HOURS

Writing – Writing Professional emails; letters introducing oneself
Grammar - Present Tense (simple and progressive); Framing questions
Vocabulary - Synonyms and Antonyms, One word substitution

UNIT-2	NARRATION AND SUMMATION	6 HOURS

Writing - Guided writing- Paragraph writing; Short Report on an event (field trip etc.)
Grammar –Past tense (simple and progressive); Subject-Verb Agreement; Prepositions
Vocabulary - Word formation - Prefixes & Suffixes; Phrasal verbs.

UNIT-3	DESCRIPTION OF A PROCESS / PRODUCT	6 HOURS

Writing -Instructions; Product /Process description.
Grammar - Degrees of comparison; Present & Past Perfect Tenses.
Vocabulary - Compound words; discourse markers- Connectives and Sequence words

UNIT-4	CLASSIFICATION ND RECOMMENDATIONS	6 HOURS

Writing – Note-making; Transferring information from non-verbal charts, graphs, etc, to verbal mode
Grammar – Relative pronouns, Simple, Compound & Complex Sentences.
Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT-5	EXPRESSION	6 HOURS

Writing – Essay Writing - Descriptive and narrative **Grammar** – Future Tenses; Negation (Statements & Questions) **Vocabulary** - Cause & Effect Expressions; Content vs Function words.	
TOTAL HOURS:	**30 HOURS**
TEXT BOOK(S):	
1.	Hewings, Martin Advanced Grammar in Use. New Delhi: CUP,2008 MLA Handbook for Writers of Research Papers, 7th Edition
2.	English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.
REFERENCE BOOKS:	
1.	Technical Communication – Principles And Practices, Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2.	A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3.	Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
LIST OF EXPERIMENTS :	
1. Listening to introductions of successful people	
2. Self-Introduction and introducing a friend	
3. Listening and filling out a form	
4. Narrating a story using hints	
5. Listening to telephone conversation	
6. Telephonic Interview- Role play	
7. Listening to podcasts, anecdotes/event narration	
8. Narrating personal experiences/ events	
9. Listening to celebrity interviews	
10. Conversation Skills- Politeness strategies	
11. Listening to process descriptions	
12. Describing a process	
13. Listening to travelogues	
14. Narrating travel experiences	
15. Listening to educational videos	
16. Group discussion	
17. Listening to TED Talks	

18. Mini Presentations
19. Listening to description of art work
20. Picture description
21. Listening to scientific lectures
22. Summarizing a lecture
23. Listening to definitions/ descriptions of objects
24. One minute speech - Describing an object
25. Listening to Tv shows
26. Anchoring a reality show
27. Listening to advertisements
28. Adzap
29. Listening to autobiography
30. Visume
TOTAL HOURS: 60 HOURS

Course Code	Course Title	L	T	P	J	C
22BST101	BASIC MATHEMATICS FOR ENGINEERS	3	2	0	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. To develop the use of matrix algebra techniques that are needed by engineers for practical applications.
2. To acquaint the students with differential calculus.
3. To explain the student with functions of several variables.
4. To make the students understand various techniques of integration and its applications.
5. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

COURSE OUTCOME:

After completion of this course, the students should be able to

1. Use the matrix algebra methods for solving practical problems.
2. Apply differential calculus tools in solving various application problems.
3. Able to use differential calculus ideas on several variable functions.
4. Apply different methods of integration in solving practical problems.
5. Apply multiple integral ideas in solving areas, volumes and other practical problems.

UNIT-1	MATRICES	9+3 HOURS

Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation

UNIT-2	DIFFERENTIAL CALCULUS	9+3 HOURS

Representation of functions - Limit of a function- Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Logarithmic differentiation - Maxima and Minima of functions of one variable.

UNIT-3	FUNCTIONS OF SEVERAL VARIABLES	9+3 HOURS

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Taylor's series for functions of two variables – Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT-4	INTEGRAL CALCULUS	9+3 HOURS

Definite and Indefinite integrals - Substitution rule - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction

UNIT-5	MULTIPLE INTEGRALS	9+3 HOURS

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids	
TOTAL LECTURE AND TUTORIAL HOURS:	**45+15 HOURS**
TEXT BOOK(S):	
1.	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons,10th Edition, New Delhi, 2016.
2.	Grewal.B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition , 2018.
3.	James Stewart, “Calculus: Early Transcendentals”, Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].
REFERENCE BOOKS:	
1.	Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016
2.	Bali. N., Goyal. M. and Watkins. C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3.	Jain. R.K. and Iyengar. S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2016.
4.	Narayanan. S. and Manicavachagom Pillai. T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5.	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6.	Srimantha Pal and Bhunia. S.C, “Engineering Mathematics" Oxford University Press, 2015.
7.	Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus", 14th Edition, Pearson India, 2018.

Course Code	Course Title	L	T	P	J	C
22BST102	Engineering Physics	3	0	0	0	3
	NIL	Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To make the students effectively achieve an understanding of mechanics.
2. To enable the students to gain knowledge of electromagnetic waves and its applications.
3. To introduce the basics of oscillations, optics and lasers.
4. Equipping the students to successfully understand the importance of quantum physics.
5. To motivate the students towards the applications of quantum mechanics.

COURSE OUTCOME:

After completion of this course, the students should be able to

CO1: Understand the importance of mechanics.

CO2: Express their knowledge in electromagnetic waves.

CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers.

CO4: Understand the importance of quantum physics.

CO5: Comprehend and apply quantum mechanical principles towards the formation of energy bands

UNIT I	MECHANICS	9 hours

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of the system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - MI of a diatomic molecule - theorems of MI –moment of inertia of continuous bodies –- torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule.

UNIT II	ELECTROMAGNETIC WAVES	9 hours

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure – basic introduction to Satellite Communication (qualitative treatment)

UNIT III	OSCILLATIONS, OPTICS AND LASERS	9 hours

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave -– interference–Michelson interferometer – Theory of laser – characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT IV	BASIC QUANTUM MECHANICS	9 hours

Photons and light waves - Electrons and matter waves – Photoelectric effect - The Schrodinger equation (Time dependent and time independent forms) - interpretation of wave function –Free particle - particle in an infinite potential well: 1D,2D and 3D Boxes- Normalization and probabilities – Bohr's correspondence principle (concept only).		
UNIT V	**APPLIED QUANTUM MECHANICS**	**9 hours**
The harmonic oscillator(qualitative)- Barrier penetration and quantum tunnelling (qualitative)- Tunnelling microscope - Resonant diode – Principle of quantum superposition – concept of quantum entanglement – concepts of quantum communication and quantum teleportation		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2.	E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3.	Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.
Reference Books	
1.	R. Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2.	Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3.	K. Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4.	D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5.	N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer Verlag, 2012.

Course Code	Course Title	L	T	P	J	C
22BST103	Engineering Chemistry	3	0	0	0	3
	NIL	Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To inculcate a sound understanding of water quality parameters and water treatment techniques.
2. To impart knowledge on the basic principles and preparatory methods of nanomaterials.
3. To introduce the different polymers and composites for engineering applications.
4. To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
5. To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

COURSE OUTCOME:

1. To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
2. To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
3. To analyze the properties of different polymers and distinguish the polymers which can be degraded and demonstrate their usefulness and composites for material selection requirements.
4. To recommend suitable fuels for engineering processes and applications.
5. To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

Unit-1	**WATER AND ITS TREATMENT**	9 hours

Water: Sources and impurities, Requirements of portable water, Desalination of brackish water: Reverse Osmosis. Requirements of water for industrial use, Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment - Ion exchange demineralization and zeolite process. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination).

Unit-2	**NANOCHEMISTRY**	9 hours

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

Unit-3	**POLYMERS AND COMPOSITES**	9 hours

Definition of biodegradable polymers- Classification of biodegradable
Polymers – Advantages, conducting polymers-polyaniline, polyacetylene, recycling of e-plastic waste (waste to wealth). Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer, matrix, metal matrix and ceramic matrix) and Reinforcement (fibre, particulates, flakes and whiskers). Properties and applications of Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

Unit-4	**FUELS AND COMBUSTION**	9 hours

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel, Knocking - octane number, diesel oil-cetane number; Power alcohol and biodiesel. Combustion of fuels: Calorific value - higher and lower calorific values, Flue gas analysis - ORSAT Method. CO2 emission and carbon footprint.		
Unit-5	**COMPUTATIONAL CHEMISTRY AND STORAGE DEVICES**	9 hours
Computational chemistry-molecular dynamics and chemical reactivity. Cheminformatics and Green IOT in biomedical applications, Artificial intelligence and machine learning methods to predict physicochemical properties. Batteries: a brief introduction to electrochemical cell (Daniel cell), Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; battery used in Electric vehicles; Fuel cells: H2-O2 fuel cell, microbial fuel cell; Super capacitors: Storage principle, types and examples.		
	Total Lecture hours:	45 hours
Text Book(s)		
1.	P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.	
2.	Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.	
3.	S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition.	
Reference Books		
1.	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Textbook of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.	
2.	O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.	
3.	Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.	
4.	ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.	
5.	O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.	

Course Code	Course Title	L	T	P	J	C
22EST101	PROBLEM SOLVING AND PYTHON PROGRAMMING	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES: After studying this course, you should be able to:

1. To understand the basics of algorithmic problem solving.
2. To learn to solve problems using Python conditionals and loops.
3. To define Python functions and use function calls to solve problems.
4. To use Python data structures - lists, tuples, dictionaries to represent complex data.
5. To do input/output with files in Python.

COURSE OUTCOME:

After completion of this course, the students should be able to

1. Develop algorithmic solutions to simple computational problems.
2. Develop and execute simple Python programs.
3. Write simple Python programs using conditionals and loops for solving problems.
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries etc.
6. Read and write data from/to files in Python programs.

UNIT-1	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9 HOURS

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert acard in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT-2	DATA TYPES, EXPRESSIONS, STATEMENTS	9 HOURS

Python interpreter and interactive mode,debugging; values and types: int, float, boolean, string and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT-3	CONTROL FLOW, FUNCTIONS, STRINGS	9 HOURS

Conditionals:Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values,parameters, local and global scope, function composition, recursion; Strings: string slices,immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search,
binary search.

UNIT-4	LISTS, TUPLES, DICTIONARIES	9 HOURS

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.		
UNIT-5	**FILES, MODULES, PACKAGES**	**9 HOURS**
Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).		
	TOTAL LECTURE HOURS:	**45 HOURS**
TEXT BOOK(S):		
1.	Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2ndEdition,O'Reilly Publishers, 2016.	
2.	Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017	
REFERENCE BOOKS:		
1.	Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition,2021.	
2.	G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.	
3.	John V Guttag, "Introduction to Computation and Programming Using Python: WithApplications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021	
4.	Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.	
5.	Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.	

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22HSM101	**HERITAGE OF TAMILS**	**0**	**1**	**0**	**0**	**1**
		Syllabus version		v. 1.0		
Unit-1	**LANGUAGE AND LITERATURE**			**03 hours**		
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.						

Course Code	Course Title	L	T	P	J	C

Unit-2	HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	03 hours
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.		
Unit-3	**FOLK AND MARTIAL ARTS**	**03 hours**
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
Unit-4	**THINAI CONCEPT OF TAMILS**	**03 hours**
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.		
Unit-5	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**03 hours**
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books		
	Total Lecture hours:	15 hours

TEXT BOOK(S)

1.	The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies.)
2.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
3.	Tamilaga Varalaru, Makalum Panpadum- Dr. K.K. Pillai
4.	Kanini Tamil- Munaivar L. Sundaram

REFERENCE BOOKS

1.	Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2.	Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies.
3.	Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr. K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4.	Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)

22EET101	ENGINEERING AND PROFESSIONAL SKILLS	1	0	2	0	2
		Syllabus version			v. 1.0	

COURSE OBJECTIVES: After studying this course, you should be able to:

1. Understand the characteristics of 'engineering' and the quality engineers have played in shaping engineering up to the present and into the future
2. Understand a range of principles in science, mathematics, and engineering in order to make well-founded decisions as part of a design process
3. To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhancethe present ability and overall utility value of content
4. To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered
5. To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, present ability, aesthetics, using media elements and enhance the overall quality of presentations.

COURSE OUTCOME:

1. Understand the basic knowledge in evolution of engineering
2. Understand the basic knowledge in Engineering approach
3. Use the MS Word to create quality documents, by structuring and organizing contentfor their day to day technical and academic requirements
4. Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
5. Use MS PowerPoint to create high quality academic presentations by including commontables, charts, graphs, interlinking other elements, and using media objects.

UNIT-1	EVOLUTION OF ENGINEERING	6 HOURS

Evolution of Engineering: Description of Engineering, Early stages of Engineering, Outline of Ancient Engineering, Case studies of historic engineers.

Introduction to Engineering Career: Engineering as a career and common qualities of employable engineers History of Engineering Domains Impact of engineering on society. Roles of Engineers and Career Paths.

UNIT-2	ENGINEERING APPROACH	6 HOURS

Introduction, problem statement: Detailing Customer Requirements, Setting Objectives, Identifying Constraints, Establishing Functions, generating solution Alternatives and Choosing a solution.

Steps in problem-solving: Problem Solving Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. seven steps in solving engineering problems, reverse engineering, forward engineering, concurrent engineering, and Value Engineering.

UNIT-3	MS WORD	6 HOURS
Create and format a document, Working with tables, Working with Bullets and Lists, Working withstyles, shapes, smart art, charts Inserting objects, charts and importing objects from other officetools, Creating and Using document templates, Inserting equations, symbols and specialcharacters, Working with Table of contents and References, citations Insert and review comments,Create bookmarks, hyperlinks, endnotes footnote, Viewing document in different modes, Working with document protection and security, Inspect document for accessibility.		
UNIT-4	**MS EXCEL**	**6 HOURS**
Create worksheets, insert and format data, Work with different types of data: text, currency, date, numeric etc. Split, validate, consolidate, Convert data Sort and filter data Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,) Work with Lookup and referenceformulae, Create and Work with different types of charts, Use pivot tables to summarizeand analysedata, Perform data analysis using own formulae and functions, Combine data from multiple worksheets using own formulae and built-in functions to generate results, Export data and sheets to other file formats, Working with macros, Protecting data and Securing the workbook		
UNIT-5	**MS POWERPOINT**	**6 HOURS**
Hours Select slide templates, layout and themes, Formatting slide content and using bullets and numbering, Insert and format images, smart art, tables, charts Using Slide master, notes and handout master, Working with animation and transitions, Organize and Group slides Import or create and use media objects: audio, video, animation, Perform slideshow recording and Record narration and create presentable videos.		
	TOTAL LECTURE HOURS:	**30 HOURS**

TEXT BOOK(S):

1.	Remesh S., Vishnu R. G., Life Skills for Engineers, Ridhima Publications, 1stEdition,2016.
2.	Barun K. Mitra, Personality Development & Soft Skills, Oxford Publishers, Third impression, 2017.
3.	Dorothy House, Microsoft Word, Excel, and PowerPoint: Just for Beginners, Import, 29 January 2015

REFERENCE BOOKS:

1.	Paul H .Wright, Introduction to Engineering, School of Civil and Environmental Engineering, 3rd Edition, John Wiley & Sons, Inc,

Course Code	Course Title	L	T	P	J	C
22ESP101	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	0	0	4	0	2
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To understand the problem solving approaches.
2. To learn the basic programming constructs in Python.
3. To practice various computing strategies for Python-based solutions to real world problems.
4. To use Python data structures - lists, tuples, dictionaries.
5. To do input/output with files in Python.

COURSE OUTCOME:

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

1. Develop algorithmic solutions to simple computational problems
2. Develop and execute simple Python programs.
3. Implement programs in Python using conditionals and loops for solving problems. 4:Deploy functions to decompose a Python program.
5. Process compound data using Python data structures.
6. Utilize Python packages in developing software applications.

LIST OF EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted tothesample experiments listed here

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weightof a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit,etc.)
2. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weightof a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit,etc.)
3. Python programming using simple statements and expressions (exchange the values of twovariables, circulate the values of n variables, distance between two points).
4. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
5. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
6. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)

7. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
8. Implementing programs using Strings. (reverse, palindrome, charactercount, replacing characters)
9. Implementing programs using written modules and Python Standard Libraries(pandas, numpy. Matplotlib, scipy)
10. Implementing real-time/technical applications using File handling. (copy from onefile to another, word count, longest word)
11. Implementing real-time/technical applications using Exception handling. (divide byzero error, voter's age validity, student mark range validation)
12. Exploring Pygame tool.
13. Developing a game activity using Pygame like bouncing ball, car race etc.

Course Code	Course Title	L	T	P	J	C
22BSP101	**PHYSICS CHEMISTRY LABORATORY (CHEMISTRY)**	**0**	**0**	**4**	**0**	**2**
	NIL	Syllabus version			v. 1.0	

Course Objectives:

1. To impart practical skills in the estimation of water quality parameters by volumetry and gravimetry.
2. To familiarize the students with the estimation of impurities in aqueous solutions through electro-analytical techniques such as pH metre, potentiometry and conductometry.
3. To demonstrate the analysis of metals by UV-Visible spectroscopy.

Course Outcome:

1. To independently estimate the water quality parameters, such as acidity, alkalinity, hardness, DO, TDS, chloride and copper contents by appropriate wet chemical analyses.
2. To quantitatively analyze the impurities in aqueous solution by electroanalytical techniques.
3. To determine the amount of metal ions in aqueous samples by spectroscopic techniques.

LIST OF EXPERIMENTS: ANY SEVEN

Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard

2. Determination of types and amount of alkalinity in water sample.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of TDS of a water sample by gravimetry.
7. Determination of strength of given hydrochloric acid using pH meter.
8. Determination of strength of acids in a mixture of acids using conductivity meter.
9. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
10. Estimation of iron content of the given solution using potentiometer.
11. Estimation of iron content of the water sample using spectrophotometer (1,10-Phenanthroline / thiocyanate method).

Total Laboratory hours:	**30hours**

Course Code	Course Title	L	T	P	J	C
22BSP101	**ENGINEERING PHYSICS LABORATORY**	**0**	**0**	**4**	**0**	**2**
	NIL	Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To learn the proper use of various kinds of physics laboratory equipment.
2. To learn how data can be collected, presented and interpreted in a clear and concise manner.
3. To learn problem solving skills related to physics principles and interpretation of experimental data.
4. To determine error in experimental measurements and techniques used to minimize such error.
5. To make the student an active participant in each part of all lab exercises.

COURSE OUTCOME:

1. Understand the functioning of various physics laboratory equipment.
2. Use graphical models to analyse laboratory data.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyse scientific information.
5. Solve problems individually and collaboratively.

LIST OF EXPERIMENTS (Any Seven Experiments)

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.

3. non-uniform bending - Determination of Young's modulus 4. Uniform bending – Determination of Young's modulus 5. Laser- Determination of the wavelength of the laser using grating 6. Air wedge - Determination of thickness of a thin sheet/wire 7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle b) Compact disc- Determination of width of the groove using laser. 8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids. 9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids 10. Post office box -Determination of Band gap of a semiconductor. 11. Photoelectric effect 12. Michelson Interferometer. 13. Melde's string experiment 14. Experiment with lattice dynamics kit.

Total Laboratory hours:	**30hours**

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22EEP101	**PRODUCT TINKERING LABORATORY**	**0**	**0**	**2**	**0**	**1**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. Hands on practical training, maintenance and troubleshooting on mechanical and electrical appliances in day-to-day life.
2. Analyse single phase and three phase residential building wiring (Energy meter, fuse, earthing)
3. Understand the internal structure and layout of the computer system.
4. Learn to diagnose minor problems with the computer functioning.
5. Know the proper usage and threats of the world wide web.

COURSE OUTCOME:

1. Students will able to understand domestic wiring procedures practically.
2. Students are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
3. Students can detect and perform minor hardware and software level troubleshooting.
4. Capacity to work on Internet & World Wide Web and make effective usage of the internet for academics.

LIST OF EXPERIMENTS:

1. **MECHANICAL EQUIPMENT STUDY**

(a) Hand drilling machine, Screw Jack and centrifugal pump

(b) Two wheeler, Refrigeration and Air Conditioning system.

2. **ELECTRICAL EQUIPMENT STUDY**

Light fittings, LED, Stabilizer, UPS, Iron box, calling bell, Fan regulator

3. ELECTRONIC EQUIPMENT STUDY

a) Study the elements of a smart phone.

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

4. COMPUTER PERIPHERALS STUDY

PC HARDWARE Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral. Functions of Motherboard. Assembling and Disassembling of PC. System Software and application software installation.

5. BIOMEDICAL EQUIPMENT

a) Assembly and dismantle of Electrocardiogram (ECG)

b) Assembly and dismantle of ventilator.

c) Assembly and dismantle of Doppler Ultra sound Scanner.

TROUBLESHOOTING

Hardware Troubleshooting: Students are to be given a PC which does not boot due to proper assembly or defective peripherals and the students should be taught to identify and correct the problem.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Internet: Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus downloads, Protection from various threats.

TOTAL LECTURE HOURS:	**30 HOURS**

SEMESTER II

Course Code	Course Title	L	T	P	J	C
22LET201	FUNCTIONAL ENGLISH	3	0	2	0	4
		Syllabus version			v. 1.1	

COURSE OBJECTIVES:

The course enables the learner to:

1. Gain confidence to respond in English in both academic and professional contexts
2. Improve presentation skills to make effective presentations
3. Foster the ability to write effectively in all contexts
4. Strengthen the skills related to teamwork and leadership roles in society as well as in the workplace

COURSE OUTCOME:

After the completion of this course, the students should be able to

1. Communicate fluently in professional situations
2. Express flexibility and appropriacy in Technical Events
3. Demonstrate complex forms and sentence structures with adequate vocabulary
4. Report events and the processes of technological & Industrial firms.
5. Present effective Profile in the context of job search

UNIT-1	COMMUNICATIVE COMPETENCE	9 HOURS

Speaking: Interactive skills- Initiation & turn taking; relevance to the topic, puzzles & riddles
Reading – Skimming, Scanning, Churning & Assimilation
Writing – Formal letters - Requisition & Business letters, Opinion paragraph
Grammar – Order of Adjectives, Primary Auxiliary Verbs
Vocabulary – Phonetics – sounds and symbols; Vocabulary used in letters and emails

UNIT-2	SITUATIONAL CONVERSATIONS	9 HOURS

Speaking – Practicing fluency- cohesion, coherence, and speed of delivery
Reading – Reading brochures and user manuals
Writing – Essay types -Compare & Contrast Essay, Argumentative Essay; Checklist
Grammar – Infinitives, Gerunds and Participles, Interrogative and Reflexive Pronoun
Vocabulary – Verbal Analogies, Same words used as different parts of speech

Unit-3	REPORT ON TECHNICAL EVENTS	9 hours

Speaking –Mock TV news Reading/ anchoring
Reading – Motivational essays on famous Engineers and Technologists
Writing – Report Writing- Survey and Accident; Project Proposals and Project Reports
Grammar – Reported Speech, Modal Verbs
Vocabulary – Technical Vocabulary, Jargon

Unit-4	DEVELOPING DISCUSSION SKILLS	9 hours

Speaking – Giving short talks on technical topics **Reading -** Descriptive passages – magazines/ articles **Writing** – Problem solution essay, Opinion Essay, Recommendations **Grammar** – If conditional sentences, Articles **Vocabulary -** Purpose statements, Vocabulary used in letters and emails		
Unit-5	**PRESENTATION SKILLS**	**9 hours**
Speaking – Presentations using visual aids- Visume using appropriate body language and gestures; stating and asking for opinions and clarifications **Reading** – Predicting the content, speed reading techniques **Writing** – Precis Writing, Minutes of Meeting, Profile Writing **Grammar** – Mixed Tenses, Embedded Clause **Vocabulary** – Error Spotting, Sentence Completion		
	TOTAL LECTURE HOURS:	**45 HOURS**
List of Experiments :		
1. Initiation and turn taking		
2. Writing opinion paragraph		
3. Situational conversations		
4. Writing Checklists		
5. Mock TV news reading		
6. Writing the project proposal or report		
7. Short talk on technical topics		
8. Writing recommendations		
9. PPT Presentation		
10. Profile writing		
	TOTAL PRACTICAL HOURS:	**30 HOURS**
Text Book(s)		
1.	English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University	
2.	Functional English for Communication (2022 edition) Ujjwala Kakarla, Guru Nanak Institutions Technical Campus (Autonomous), Hyderabad.	
Reference Books		
1.	Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.	
2.	Hewings, Martin. Advanced Grammar In Use. New Delhi: CUP,2008 MLA Handbook for Writers of Research Papers, 7th Edition	
3.	Klaus Bruhn Jensen. A handbook of Media and Communication Research. Routledge, 2003	

Course Code	Course Title	L	T	P	J	C
22LET202	FRENCH LANGUAGE	3	0	2	0	4
		Syllabus version			v. 1.0	

Course Objectives:

1. To acquire an understanding of basic French language parts of speech
2. To facilitate learner's ability to learn the French language grammar.
3. To nurture learner's ability to understand the sentence structure
4. To foster technical writing skills through tenses and numbers
5. To comprehend various lectures and talks

Course Outcome:

1. Read and write technical basic French language parts of speech
2. Speak appropriately learner's ability to learn the French language grammar.
3. Listen and comprehend lectures learner's ability to understand the sentence structure
4. Write correctly, clearly and concisely technical writing skills through tenses andnumbers
5. Prepare self-introduction comprehend various lectures and talks

Unit-1	PARTS OF SPEECH	12 hours

1. inviter et répondre à une invitation, Pronoms sujets 2. L'article définis, l'article indéfinis

3. Conjugation : présent, adjectifs possessifs 4. interrogation, décrire les personnes 5. Lavie dequatre parisiens de professions différentes

Unit-2	ELEMENTS OF GRAMMAR:	12 hours

1. Exprimer l'ordre et l'obligation demander et commander 51
2. l'adjectif possessifs, l'‟article partitif, l'article démonstratif, négation ne
3. pas, l'article contracté 4. verbe pronominaux 5. prepositions

Unit-3	SENTENCE STRUCTURE:	12 hours

1. Raconter et reporter-donner son avis
2. Futur simple, pronom complètement d'objet direct, passé composé
3. plusieurs région de France, imparfait, pronom y/en, imparfait

Unit-4	TENSES AND NUMBERS	12 hours
1. Demander l'autorisation-passé récent, futur proche 2. La vie administrative et régionale, Pluriel des noms, moyens de transport		
Unit-5	**DISCOURSE**	**12 hours**
1. le discours rapporté, décrire un lieu, exprimer ses préférences 2. décrire la carrière,discuterd‟système éducation de France 3. parler de la technologie de l‟information		
	Total Lecture hours:	45 hours

Text Book(s)	
1.	Christine Andant étal "À propos (livre de l'élève", LANGER., NEW DELHI,2012
2.	Myrna Bell Rochester "Easy French Step By Step", MCGraw Hill Companies., USA, 2008
Reference Books	
1.	Michael D. Oates "Entre Amis: An Interactive Approach", 5 th Edition, Houghton Mifflin., 2005
2.	Bette Hirsch, Chantal Thompson "Moments Literaries : An Anthology for intermediate French"
3.	Simone Renaud, Dominique van Hooff "En bonne forme

Course Code	Course Title	L	T	P	J	C
22LET203	GERMAN LANGUAGE	3	0	2	0	4
		Syllabus version			v. 1.0	

Course Objectives:

1. To acquire an understanding of basic German language parts of speech
2. To facilitate learner's ability to learn the German language grammar.
3. To nurture learner's ability to understand the sentence structure
4. To foster technical writing skills through tenses and numbers
5. To comprehend various lectures and talks

Course Outcome:

1. Read and write technical basic German language parts of speech
2. Speak appropriately learner's ability to learn the German language grammar.
3. Listen and comprehend lectures learner's ability to understand the sentencestructure
4. Write correctly, clearly and concisely technical writing skills through tenses and numbers
5. Prepare self-introduction comprehend various lectures and talks

Unit-1	GUTEN TAG!	10 hours

1. To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages
2. Vocabulary: related to the topic
3. 3. Grammar: W – Questions, Verbs & Personal pronouns I

Unit-2	FREUNDE, KOLLEGEN UND ICH	10 hours

1. To speak about hobbies, jobs, learn numbers from 20; build dialogues and frame simplequestions & answers
2. Vocabulary: related to the topic
3. Grammar: Articles, Verbs & Personal pronouns II, sein & haben verbs, ja/nein Frage, singular/plural

Unit-3	IN DER STADT	12 hours

1. To know places, buildings, question, know transport systems, understand international words;build dialogues and write short sentences
2. Vocabulary: related to the topic
3. Grammar: Definite & indefinite articles, Negotiation, Imperative with Sien verbs

Unit-4	GUTEN APPETIT!	13 hours

1. To speak about food, shop, converse; Vocabulary: related to the topic; build dialogues and writeshort sentences 2. Grammar: Sentence position, Accusative, Accusative with verbs, personal pronouns & prepositions, Past tense of haben & sein verbs		
Unit-5	**TAG FŸR TAG/ZEIT MIT FREUNDEN**	**15 hours**
1. To learn time related expressions, speak about family, about birthdays, understand & write invitations, converse in the restaurant; ask excuse, fix appointments on phone 2. Vocabulary: related to the topic 3. Grammar: Time related prepositions, Possessive articles, Modalverbs		
	Total Lecture hours:	**60 hours**

Text Book(s)	
1.	Dengler Stefanie "Netzwerk A1.1", Klett-Langenscheidt Gmbh., München,2013
2.	Sandra Evans, Angela Pude "Menschen A1", Hueber Verlag., Germany, 2012
Reference Books	
1.	Stefanie Dengler "Netzwerk A1", Klett-Langenscheidt Gmbh., München, 2013
2.	Hermann Funk, Christina Kuhn "Studio d A1", Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2009
3.	Rosa-Maria Dallapiazza "Tangram Aktuell 1 (Deutsch als Fremdsprache)", Max Hueber Verlag., Munchen, 2004
4.	Christiane Lemcke und Lutz Rohrmann ""‘Grammatik Intensivtrainer A 1", Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2012

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22LET204	**JAPANESE LANGUAGE**	**3**	**0**	**2**	**0**	**4**
		Syllabus version			v. 1.0	
Course Objectives:						
1. To acquire an understanding of basic Japanese language parts of speech 2. To facilitate learner’s ability to learn the Japanese language grammar. 3. To nurture learner’s ability to understand the sentence structure 4. To foster technical writing skills through tenses and numbers 5. To comprehend various lectures and talks						
Course Outcome:						

1. Read and write technical basic Japanese language parts of speech
2. Speak appropriately learner's ability to learn the Japanese language grammar.
3. Listen and comprehend lectures learner's ability to understand the sentencestructure
4. Write correctly, clearly and concisely technical writing skills through tenses and numbers
5. Prepare self-introduction comprehend various lectures and talks

Unit-1	JAPANESE PEOPLE AND CULTURE	12 hours

1. Basic greetings and responses

2. Basic script–Method of writing hiragana and katakana –Combination sounds and simple words

3. Self-introductions:"Hajimemashite" -Demonstratives "Kore", "Sore", "Are"–Demonstrative "Kono","Sono","Ano"

4. Possessive noun particle "no" –Japanese apartments: Greeting your neighbor

Unit-2	PATICLE "NI (AT)" FOR TIME	12 hours

: 1. kara (from) ~ made(until) – Particle "to (and)"

2. Time periods: Days of the week, months, time of day –Verbs (Present / future and pasttense)

3. Telephone enquiry: Asking for a phone no. And business hours- Destination particle "e".

Unit-3	LIKES AND DISLIKES	12 hours

1. Potential verbs (wakarimasu and dekimasu) – "Kara (~ because)"

2. Adverbs –Asking some one out over the phone-Verbs denoting presence

3. Introduction to Adjectives (na and ii type) -Verb groups – I, II and III – Exercises to group verbs- Please do (te kudasai)

4. Present continuous tenses (te imasu) – Shall I? (~ mashou ka) – Describing a natural phenomenon (It is raining) (12)

Unit-4	DIFFERENT USAGES OF ADJECTIVES	12 hours

1. Comparison –Likes and dislikes –Going to a trip- Need and desire (ga hoshii) –Wanting to…(Tabeti desu)- Going for a certain purpose (mi –ni ikimasu)

2. Choosing from a menu-Adjectives ("i" and "na" type) – Adjectives (Positive and negative useage)

Unit-5	ROLE PLAYS IN JAPANESE	12 hours

1. Framing simple questions & answers

2. Writing Short paragraphs & Dialogues

3. A demonstration on usage of chopsticks and Japanese tea party (12)

Total Lecture hours:	60 hours
Text Book(s)	
1.	Minna no Nihongo, Honsatsu Roma "ji ban (Main Textbook Romanized Version)", International publisher – 3A Corporation., Tokyo, 2012
Reference Books	
1.	Eri Banno et.al "Genki I: An Integrated Course in Elementary Japanese I -Workbook",1999
2.	Tae Kim "A Guide to Japanese Grammar: A Japanese Approach to Learning Japanese Grammar", 2014
3.	Minna No Nihongo "Translation & Grammatical Notes In English Elementary",

Course Code	Course Title	L	T	P	J	C
22BST201	STATISTICS AND TRANSFORMS	3	2	0	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. This course aims at providing the necessary basic concepts of a few statistical and numericalmethods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
2. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
3. To acquaint the student with Fourier series techniques in solving heat flow problems used invarious situations.
4. To acquaint the student with Fourier, transform techniques used in wide variety of situations.
5. To acquaint the student with Z, transform techniques used in wide variety of situations.

COURSE OUTCOME:

1. Apply the concept of testing of hypothesis for small and large samples in real life problems.
2. Apply the basic concepts of classifications of design of experiments in the field of agriculture.
3. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT-1	TESTING OF HYPOTHESIS	12 HOURS

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit

UNIT-2	DESIGN OF EXPERIMENTS	12 HOURS

One way and two-way classifications - Completely randomized design – Randomized block design – Latin square design.		
UNIT-3	**FOURIER SERIES**	**12 HOURS**
Dirichlet's conditions — General Fourier series — Odd and even functions — Half range sine series — Half range cosine series — Parseval's identity — Harmonic analysis.		
UNIT-4	**FOURIER TRANSFORMS**	**12 HOURS**
Fourier transform pair — Fourier sine and cosine transforms — Properties — Transforms of simple functions — Convolution theorem- Parseval's identity		
UNIT-5	**Z — TRANSFORMS**	**12 HOURS**
Z-transforms — Elementary properties — Inverse Z-transform (using partial fraction and residues)— Convolution theorem.		
	TOTAL LECTURE HOURS:	**60 HOURS**

TEXT BOOK(S)

1.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2.	Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
3.	Narayanan S., Manicavachagom Pillay. T. K and Ramanaiah. G "Advanced Mathematics for Engineering Students", Vol. II & III, S. Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCE BOOKS

1.	Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand &Sons, New Delhi, 12th Edition, 2020.
2.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014
3.	Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability andStatistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
4.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineersand Scientists", 9th Edition, Pearson Education, Asia, 2010
5.	Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.
6.	Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.
7.	Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.
8.	James, G., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
9.	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi,2016.
10.	Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

Course Code	Course Title	L	T	P	J	C
22BST204	PHYSICS FOR INFORMATION SCIENCE	3	0	0	0	3
	Engineering Physics	Syllabus version			v. 1.0	

Course Objectives:

• To make the students understand the importance in studying electrical properties of materials.

• To enable the students to gain knowledge in semiconductor physics

• To instill knowledge on magnetic properties of materials.

• To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications

• To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

Course Outcome:

• gain knowledge on classical and quantum electron theories, and energy band structures

• acquire knowledge on basics of semiconductor physics and its applications in various devices

• get knowledge on magnetic properties of materials and their applications in data storage,

• have the necessary understanding on the functioning of optical materials for optoelectronics

• understand the basics of quantum structures and their applications and basics of quantum computing

UNIT I	**ELECTRICAL PROPERTIES OF MATERIALS**	**9 hours**
	Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three-dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.	
UNIT II	**SEMICONDUCTOR PHYSICS**	**9 hours**
	Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Hall effect and devices – Ohmic contacts – Schottky diode.	
UNIT III	**MAGNETIC PROPERTIES OF MATERIALS**	**9 hours**
	Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction-saturation magnetization and Curie temperature – Domain Theory- M versus H behavior – Hard and soft magnetic materials – examples and	

	uses-– Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).	
UNIT IV	**OPTICAL PROPERTIES OF MATERIALS**	**9 hours**
	Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.	
UNIT V	**NANODEVICES AND QUANTUM COMPUTING**	**9 hours**
	Introduction - quantum confinement – quantum structures: quantum wells, wires and dots — band gap of nanomaterials. Tunnelling – Single electron phenomena: Coulomb blockade - resonant- tunnelling diode – single electron transistor - Quantum system for information processing - quantum states – classical bits – quantum bits or qubits – advantage of quantum computing over classical computing – few examples demonstrating quantum computing - virtual lab (using IBM quantum computer through their cloud platform).	
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007.
2.	S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
3.	Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.
Reference Books	
1.	Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2.	Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3.	V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge Univ.Press, 2008.
4.	G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
5.	B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.

Course Code	Course Title	L	T	P	J	C
22CST201	OBJECT ORIENTED PROGRAMMING	2	0	2	0	3
		Syllabus version			v. 1.0	

Unit-1	CONCEPTS OF OBJECT ORIENTED PROGRAMMING	9 hours

Abstract Data types – Inheritance – Polymorphism – Object Identity – Object Modeling – Object Oriented Programming Languages – Object Oriented Databases – Object Oriented user Interfaces – Object Oriented GIS – Object Oriented Analysis – Object Oriented Design

Unit-2	C++ PROGRAMMING	9 hours

Introduction to C++ - Keywords, Identifiers – Data types – Variables – Operators – Manipulators – Operator Overloading – Operator Precedence – Control Statements – Functions – Call by Reference – Arguments – Function Overloading

Unit-3	CLASSES AND OBJECTS	9 hours

Classes and Objects – Member Functions – Private and Public Member function – Nesting of Member Functions – Array of Objects – Pointer to Members – Constructors – Destructors – Type Conversions

Unit-4	INHERITANCE AND POLYMORPHISM	9 hours

Inheritance – Base class – Derived Class – Visibility modes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Nesting – Polymorphism – File – Opening and Closing – File Modes – File Pointers – Random Access – Error Handling –

Unit-5	GIS CUSTOMISATION PROGRAMMING USING VISUAL BASIC	9 hours

Accessing databases with the Data Controls – ADO Object Model – ODBC and data access Objects – ODBC using DAO and Remote Data Objects – Data Environment and Data Report – ActiveX Controls – GIS Customisation

TOTAL LECTURE HOURS:	45 hours

Text Book(s)

1.	Balagurusamy.E., Object Oriented Programming with C++, Tata Mc.Graw Hill Publications, 2001
2.	Stanley B.Lippman, A C++ Primer, 2 nd Edition, Addison Wesley Publications, Second Edition 2000

Reference Books

1.	Bjarne Stroustrup, The C++ Programming Language, Addison Wesley Publications, Third Edition, 2000.
2.	Tony Stevenson, Visual Basic 6: The Complete Reference, Osborne/ McGraw- Hill, 2000.
3.	David S. Platt, Introducing Microsoft .NET Microsoft Press, Saarc Edition, 2001.

EXPERIMENTS:

1. Program using Functions
   - Functions with Default arguments, Friend Function, Inline Function
   - Implementation of Call by Value, Address, Reference

2. Simple classes for understanding objects, member functions, constructors, destructor, copy constructor.
   - Classes with Primitive Data Members
   - Classes with Arrays as Data Members
   - Classes with Pointers as Data Members
   - Classes with Constant Data Members
   - Classes with Static Member Functions
3. Compile Time Polymorphism
   - Operator Overloading
   - Function Overloading
4. Run Time Polymorphism
   - Various Forms of Inheritance
   - Virtual Functions
   - Virtual Base Classes
   - Templates

Course Code	Course Title	L	T	P	J	C
22EST205	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**3**	**0**	**0**	**0**	**3**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To introduce the basics of electric circuits and analysis
2. To impart knowledge in the basics of working principles and application of electrical machines
3. To introduce analog devices and their characteristics
4. To educate on the fundamental concepts of linear integrated circuits
5. To introduce the functional elements and working of measuring instruments.

COURSE OUTCOME:

1. Compute the electric circuit parameters for simple problems
2. Explain the working principle and applications of electrical machines
3. Analyze the characteristics of analog electronic devices
4. Explain the basic concepts of linear integrated circuits
5. Explain the operating principles of measuring instruments.

UNIT-1	ELECTRICAL CIRCUITS	9 HOURS

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)		
UNIT-2	**ELECTRICAL MACHINES**	**9 HOURS**
Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.		
UNIT-3	**ANALOG ELECTRONICS**	**9 HOURS**
Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters		
UNIT-4	**DIGITAL ELECTRONICS**	**9 HOURS**
Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only).		
UNIT-5	**MEASUREMENTS AND INSTRUMENTATION**	**9 HOURS**
Functional elements of an instrument, Standards and calibration, Operating Principle , types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT,DSO- Block diagram- Data acquisition		
	TOTAL LECTURE HOURS:	**45 HOURS**

TEXT BOOK(S):

1.	D P Kothari and I.J Nagrath, "Basic Electrical and Electronics Engineering", McGraw Hill Education, Second Edition, 2020.
2.	Allan S Moris, "Measurement and Instrumentation Principles", Third Edition, Butterworth Heinemann, 2001
3.	S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
4.	James A .Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.

REFERENCE BOOKS:

1.	Thomas L. Floyd, 'Electronic Devices', 10th Edition, Pearson Education, 2018
2.	A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi,January 2015.
3.	Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017

Course Code	Course Title	L	T	P	J	C
22EST202	ENGINEERING GRAPHICS	1	0	4	0	3
		Syllabus version			v. 2.0	

COURSE OBJECTIVES:

1. To develop students, graphic skills for communication of concepts, ideas and design of engineering products.
2. To expose them to existing National standards related to technical drawings.
3. To Familiarize with basic geometrical constructions and orthographic projections.
4. To make the students to draw the different projections of the solids.
5. To view the true shape and apparent shape of the sectioned solids and their developments.
6. To get an idea about 3D views through isometric projections.

COURSE OUTCOME:

1. Perform basic geometrical constructions and principles of orthographic projections.
2. Project orthographic projections of lines and plane surfaces.
3. Draw projections of solids and development of surfaces.
4. Visualize and to project isometric views and conversion of Isometric views to Orthographic views.
5. Understand the basics of AUTO CAD and fundamentals of perspective projections.

UNIT-0	CONCEPTS AND CONVENTIONS (Not for Examination)	3+9 HOURS

Importance of graphics in engineering applications — Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT-1	PLANE CURVES, PROJECTIONOF POINTS AND LINES	3+9 HOURS

Conic Sections - Construction of Ellipse, Parabola & hyperbola by eccentricity method – Construction of cycloid. Introduction of Orthographic projection.

First angle projection - projection of points and Projection of Lines (only for understanding)

UNIT-2	PROJECTION OF PLANES AND SOLIDS	3+9 HOURS

Projection of simple planes (Square, circular, Hexagon, Pentagon) inclined to both the principal planes by rotating object method. Projection of simple solids like Prism, Pyramid, Cylinder& Cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT-3	SECTION AND DEVELOPMENT SURFACES OF SOLIDS	3+9 HOURS

Sectioning of simple solids (Prism, Pyramid, Cylinder& Cone) in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of surfaces of right regular sectioned solids

UNIT-4	ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS	3+9 HOURS
Principles of Isometric Projections-Isometric scale- Isometric Views of simple and truncated solids. Conversion of Isometric views of the objects to Orthographic views Exercises using free hand sketching.		
UNIT-5	**COMPUTER AIDED DRAFTING (Only for Internal Evaluation)**	**3+9 HOURS**
Introduction to engineering graphics CAD tools, Drawing Orthographic views from Isometric views using CAD tools--Floor plans of simple buildings- Exercise of circuit diagram (2D Orthographic Views) and 3D modeling (Isometric Views) using AutoCAD Software.		
Special points applicable to University Examinations on Engineering Graphics: 1. There will be five questions, each of either or type covering all units of the syllabus. 2. All questions will carry equal marks of 20 each making a total of 100. 3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size 4. The examination will be conducted in appropriate sessions on the same day		
	TOTAL LECTURE HOURS:	**60 HOURS**

TEXT BOOK(S):

1.	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2.	Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3.	Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCE BOOKS:

1.	Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edit ion, 2019.
2.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3.	Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4.	Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5.	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6.	Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

LIST OF EQUIPMENTS

S. NO	DESCRIPTION OF EQUIPMENT	QUANTITY
1.	Computer nodes or systems with suitable graphics facility	30 Nos
2.	Software for Drafting and Modelling	30 Nos
3.	Laser Printer or Plotter to print / plot drawings	1 No

LIST OF EXPERIMETS:

1. Drawing of a title block with necessary text, projection symbol and lettering using drafting software.
2. Drafting of Conic curves - Ellipse, Parabola and Hyperbola
3. Drawing orthographic view of simple solids like Prism, Pyramids, Cylinder, Cone, etc, and dimensioning.
4. Drawing of simple solids like prism and pyramids when the axis is inclined to HP.
5. Drawing of simple solids like cylinder and cone when the axis is inclined to HP.
6. Drawing isometric projection of simple solids.
7. Drawing of star –delta starter circuit
8. Drawing an electrical circuit of three-point starter.
9. Drawing of an electrical power supply circuit.
10. Drawing of Hartley oscillator.

Course Code	Course Title	L	T	P	J	C
22HSM201	TAMILS AND TECHNOLOGY	0	1	0	0	1
		Syllabus version			v. 1.0	

Unit-1	WEAVING AND CERAMIC TECHNOLOGY	03 hours

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

Unit-2	DESIGN AND CONSTRUCTION TECHNOLOGY	03 hours

Designing and Structural construction House & Designs in household materials during Sangam
Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

Unit-3	MANUFACTURING TECHNOLOGY	03 hours

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem

stone types described in Silappathikaram.		
Unit-4	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	**03 hours**
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		
Unit-5	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	**03 hours**
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.		
	Total Lecture hours:	15 hours

TEXT BOOK(S)	
1.	The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies.)
2.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
3.	Tamilaga Varalaru, Makalum Panpadum- Dr. K.K. Pillai
4.	Kanini Tamil- Munaivar L. Sundaram
5.	Porunai- Attrangarai Nagarigam
REFERENCE BOOKS	
1.	Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2.	Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies.
3.	Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr. K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4.	Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)
5.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6.	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book

Course Code	Course Title	L	T	P	J	C
22EET201	INNOVATIONS AND DESIGN THINKING	2	0	0	0	2
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. Learn design thinking concepts and principles
2. Use design thinking methods in every stage of the problem
3. Learn the different phases of design thinking
4. Apply various methods in design thinking to different problems
5. Apply the various the testing and implementation

COURSE OUTCOME:

1. Innovation of the new environmental conditions
2. Define key concepts of design thinking
3. Practice design thinking in all stages of problem-solving
4. Apply design thinking approach to real-world problems
5. Understand the testing and implementation

UNIT-1	INNOVATIONS	6 HOURS

Introduction, innovation in current environment, types of innovation, schools of innovation, analyzing the current business scenario, challenges of innovation, steps of innovation management, experimentation in innovation management, participation for innovation, co-creation for innovation, prototyping to incubation. blue ocean strategy –I, blue ocean strategy-II. marketing of innovation, technology innovation process.

UNIT-2	DESIGN THINKING	6 HOURS

Design Thinking Approach:-Introduction to Design Thinking, Iterative Design Thinking Process Stages. Design Thinking as Divergent-Convergent Questioning. Design Thinking in a Team Environment, System Thinking, Product Thinking.

UNIT-3	UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM	6 HOURS

Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.

UNIT-4	IDEATION AND PROTOTYPING	6 HOURS
Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.		
UNIT-5	**TESTING AND IMPLEMENTATION**	**6 HOURS**
Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.		
	TOTAL LECTURE HOURS:	**30 HOURS**

TEXT BOOK(S):	
1.	Christian Mueller-Rotenberg, Handbook of Design Thinking - Tips & Tools for how todesign thinking.
2.	Designing for Growth: a design thinking tool kit for managers by Jeanne Liedtka and Tim Ogilvie.
3.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.
4.	John. R. Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage Learning (International edition) Second Edition, 2013
REFERENCE BOOKS:	
1.	Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media,2017.
2.	Roger Martin, "The Design of Business: Why Design Thinking is the Next CompetitiveAdvantage", Harvard Business Press, 2009.
3.	Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 201 4. http://ajjuliani.com/design-thinking-activities/ 5. https://venturewell.org/class-exercises
4.	Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning,Second Edition, 2011.

COURSE CODE	COURSE TITLE	L	T	P	J	C
22NCC201	NCC Credit Course Level 1* (ARMY WING)	1	0	0	0	1
		Syllabus version			v. 1.0	

UNIT-1	NCC GENERAL	3 HOURS

NCC 1 Aims, Objectives & Organization of NCC
NCC 2 Incentives
NCC 3 Duties of NCC Cadet
NCC 4 NCC Camps: Types & Conduct

UNIT-2	NATIONAL INTEGRATION AND AWARENESS	3 HOURS

NI 1 National Integration: Importance & NecessityNI
2 Factors Affecting National Integration
NI 3 Unity in Diversity & Role of NCC in Nation Building
NI 4 Threats to National Security

UNIT-3	PERSONALITY DEVELOPMENT	3 HOURS

PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem SolvingPD 2 Communication Skills
PD 3 Group Discussion: Stress & Emotions

UNIT-4	LEADERSHIP	2 HOURS

L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour CodeL 2
Case Studies: Shivaji, Jhasi Ki Rani

UNIT-5	SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	4 HOURS

SS 1 Basics, Rural Development Programmes, NGOs, Contribution o YouthSS 2
Protection of Children and Women Safety
SS 3 Road / Rail Travel SafetySS
4 New Initiatives
SS 5 Cyber and Mobile Security Awareness

TOTAL LECTURE HOURS	15 HOURS

COURSE CODE	COURSE TITLE	L	T	P	J	C
22NCC202	NCC Credit Course Level 1* (NAVAL WING)	1	0	0	0	1
		Syllabus version			v. 1.0	

UNIT-1	NCC GENERAL	3 HOURS
NCC 1 Aims, Objectives & Organization of NCC NCC 2 Incentives NCC 3 Duties of NCC Cadet NCC 4 NCC Camps: Types & Conduct		

UNIT-2	NATIONAL INTEGRATION AND AWARENESS	3 HOURS
NI 1 National Integration: Importance & NecessityNI 2 Factors Affecting National Integration NI 3 Unity in Diversity & Role of NCC in Nation Building NI 4 Threats to National Security		

UNIT-3	PERSONALITY DEVELOPMENT	3 HOURS
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem SolvingPD 2 Communication Skills PD 3 Group Discussion: Stress & Emotions		

UNIT-4	LEADERSHIP	2 HOURS
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour CodeL 2 Case Studies: Shivaji, Jhasi Ki Rani		

UNIT-5	SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	4 HOURS
SS 1 Basics, Rural Development Programmes, NGOs, Contribution o YouthSS 2 Protection of Children and Women Safety SS 3 Road / Rail Travel SafetySS 4 New Initiatives SS 5 Cyber and Mobile Security Awareness		
	TOTAL LECTURE HOURS	15 HOURS

COURSE CODE	COURSE TITLE	L	T	P	J	C
22NCC203	NCC Credit Course Level 1* (AIR FORCE WING)	1	0	0	0	1
		Syllabus version			v. 1.0	

UNIT-1	NCC GENERAL	3 HOURS

NCC 1 Aims, Objectives & Organization of NCC
NCC 2 Incentives
NCC 3 Duties of NCC Cadet
NCC 4 NCC Camps: Types & Conduct

UNIT-2	NATIONAL INTEGRATION AND AWARENESS	3 HOURS

NI 1 National Integration: Importance & NecessityNI
2 Factors Affecting National Integration
NI 3 Unity in Diversity & Role of NCC in Nation Building
NI 4 Threats to National Security

UNIT-3	PERSONALITY DEVELOPMENT	3 HOURS

PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem SolvingPD 2 Communication Skills
PD 3 Group Discussion: Stress & Emotions

UNIT-4	LEADERSHIP	2 HOURS

L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour CodeL 2
Case Studies: Shivaji, Jhasi Ki Rani

UNIT-5	SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	4 HOURS

SS 1 Basics, Rural Development Programmes, NGOs, Contribution o YouthSS 2
Protection of Children and Women Safety
SS 3 Road / Rail Travel SafetySS
4 New Initiatives
SS 5 Cyber and Mobile Security Awareness

TOTAL LECTURE HOURS	15 HOURS

Course Code	Course Title	L	T	P	J	C
22ESP201	ENGINEERING PRODUCT LABORATORY	0	0	3	0	1.5
		Syllabus version			v. 2.0	

COURSE OBJECTIVES: The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB

COURSE OUTCOME: At the end of the course, the student will be able to

1. Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
2. Wire various electrical joints in common household electrical wire work.
3. Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
4. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

LIST OF EXPERIMENTS:

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES PLUMBING WORK 15

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

PART II ELECTRICAL ENGINEERING PRACTICES 15

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring with introduction to CFL and LED types.
3. Stair case wiring

4. Residential house wiring using fuse, switch, indicator, lamp and energy meter.
5. Measurement of energy using single phase energy meter.

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES **15**

WELDING WORK:

Demonstrating welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

BASIC MACHINING WORK:

Demonstrating of a) (simple)Turning. b) (simple)Drilling. c) (simple)Tapping.

3D PRINITNG:

Demonstrating of working principle of 3D Printer machine.

FOUNDRY WORK:

a) Demonstrating basic foundry operations

SHEET METAL WORK:

b) Making of a square tray
c) Making of a cone

FITTING EXERCISE:

Make a model by using fitting exercise

PART IV ELECTRONIC ENGINEERING PRACTICES **15**

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2.Study of logic gates AND, OR, EOR and NOT.
3.Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL LABORATORY HOURS:	**60 HOURS**

Course Code	Course Title	L	T	P	J	C
22ESP203	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	0	0	3	0	1.5
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To train the students in conducting load tests on electrical machines2.To gain practical experience in characterizing electronic devices 3.To train the students to use DSO for measurements

COURSE OUTCOME:

After completing this course, the students will be able to

1. Use experimental methods to verify the Ohm's and Kirchhoff's Laws.
2. Analyze experimentally the load characteristics of electrical machines
3. Analyze the characteristics of basic electronic devices
4. Use DSO to measure the various parameters

LIST OF EXPERIMENTS:

ELECTRICAL

1. Verification of ohms and Kirchhoff's Laws.
2. Load test on DC Shunt Motor.
3. Load test on Self Excited DC Generator
4. Load test on Single phase Transformer
5. Load Test on Induction Motor

ELECTRONICS

6. Experiment on Transistor based application circuits (Inverting and non-inverting amplifieror switching circuits) (Or) Experiments on Operational Amplifier based Inverting and non- inverting amplifier.
7. Experiments on ADC.
8. Experiments on 555 timer

MEASUREMENTS

9. Study on function of DSO.
10. Measurement of Amplitude, Frequency, Time, Phase Measurement using DSO.

TOTAL LECTURE HOURS:	**60 HOURS**

SEMESTER III

Course Code	Course Title	L	T	P	J	C
22CST301	**SYSTEM SOFTWARE**	**3**	**0**	**0**	**0**	**3**
		Syllabus version			v. 1.0	

Course Objectives:

1. To understand the relationship between system software and machine architecture.
2. To know the design and implementation of assemblers
3. To know the design and implementation of linkers and loaders.
4. To have an understanding of macro processors.
5. To have an understanding the basic concepts of system software.

Course Outcome:

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

1. Understand about the system software and machine architecture.
2. Understand the concepts of assemblers.
3. Design of loaders and linkers.
4. Understand the concepts of macro processor
5. Understanding of system software tools.

Unit-1	**INTRODUCTION**	9 hours
	System software and machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes -instruction sets - I/O and programming.	
Unit-2	**ASSEMBLERS**	9 hours
	Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - MASM assembler.	
Unit-3	**LOADERS AND LINKERS**	9 hours
	Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features – Automatic Library	

	Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders	
Unit-4	**MACRO PROCESSORS**	9 hours
	Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features -Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro	
Unit-5	**SYSTEM SOFTWARE TOOLS**	9 hours
	Text editors - Overview of the Editing Process - User Interface –Editor Structure. - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.	
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Leland L. Beck, "System Software – An Introduction to Systems Programming",3rd Edition, Pearson Education Asia, 2006.

Reference Books	
1.	D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 2000.
2.	John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 2000.
3.	John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000

Course Code	Course Title	L	T	P	J	C
22CST302	Programming In Java	3	0	2	0	5
		Syllabus version			v. 1.0	

Course Objectives:

1. To understand Object Oriented Programming concepts and basics of Java programminglanguage
2. To know the principles of packages, inheritance and interfaces
3. To develop a java application with threads and generics classes
4. To define exceptions and use I/O streams
5. To design and build Graphical User Interface Application using JAVAFX

Course Outcome:

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

1. Apply the concepts of classes and objects to solve simple problems
2. Develop programs using inheritance, packages and interfaces
3. Make use of exception handling mechanisms and multithreaded model to solve real world problems
4. Build Java applications with I/O packages, string classes, Collections and generics concepts
5. Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications

Unit-1	INTRODUCTION TO OOP AND JAVA	9 hours
	Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors Methods -Access specifiers – Static members- Java Doc comments.	

Unit-2	INHERITANCE, PACKAGES AND INTERFACES	9 hours
	Overloading Methods – Objects as Parameters – ReturningObjects – Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding –Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.	
Unit-3	**EXCEPTION HANDLING AND MULTITHREADING**	**9 hours**

	Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads – Multithreading. Wrappers – Auto boxing.	
Unit-4	**I/O, GENERICS, STRING HANDLING**	**9 hours**
	I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.	
Unit-5	**JAVAFX EVENT HANDLING, CONTROLSAND COMPONENTS**	**9 hours**
	JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem.	
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019
2.	Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015

Reference Books

1.	Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.

Extensive Reading:

- http://www.kodejava.org/
- http://docs.oracle.com/javase/tutorial/
- http://www.devx.com/
- http://horstmann.com/corejava
- http://www.oracle.com/technetwork/java/index.html
- http://www.tutorialspoint.com

LIST OF EXPERIMENTS

1. Solve problems by using sequential search, binary search, and quadratic sorting algorithms (selection, insertion)
2. Develop stack and queue data structures using classes and objects.
3. Develop a java application with an Employee class with Emp_name, Emp_id, Address.
4. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea( ) that prints the area of the given shape.
5. Solve the above problem using an interface.
6. Implement exception handling and creation of user defined exceptions. Write a java program that implements a multi-threaded application that has three threads. Firstthread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
7. Write a program to perform file operations.
8. Develop applications to demonstrate the features of generics classes
9. Develop applications using JavaFX controls, layouts and menus.
10. Develop a mini project for any application using Java concepts

Course Code	Course Title	L	T	P	J	C
22CST303	DATABASE MANAGEMENT SYSTEMS	3	0	0	0	3
		Syllabus version				v. 1.0

Course Objectives:

2. To learn the fundamentals of data models, relational algebra and SQL
3. To represent a database system using ER diagrams and to learn normalization techniques
4. To understand the fundamental concepts of transaction, concurrency and recovery processing
5. To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
6. To have an introductory knowledge about the Distributed databases, NOSQL and database security

Course Outcome:

Upon completion of this course, the students will be able to

1. Construct SQL Queries using relational algebra
2. Design database using ER model and normalize the database
3. Construct queries to handle transaction processing and maintain consistency of thedatabase
4. Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database
5. Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement.

Unit-1	CONCEPTUAL DATA MODELING	8 hours
	Database architecture – Database system development lifecycle – Requirements collection – Databasedesign -- Entity- Relationship model – Enhanced-ER model	

Unit-2	RELATIONAL MODEL AND SQL	10 hours
	Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation — Boyce/Codd Normal Form — Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form	

Unit-3	**RELATIONAL DATABASE DESIGN AND NORMALIZATION**	**10 hours**
	Functional dependencies – Update anomalies -Inference rules – Minimal cover - Properties of relational decomposition – Normalization(up to BCNF).	
Unit-4	**TRANSACTION MANAGEMENT**	**8 hours**
	Transaction concepts – ACID properties – Schedules – Serial , NonSerial and Conflict Serializability – Serializability – types of Serializability– Concurrency Control – Two- Phase locking techniques.	
Unit-5	**QUERY PROCESSING**	**9 hours**
	File organization: – File organization – various kinds of indexes and Hashing Techniques - Query Processing – Measures of query cost - Selection operation – Projection operation, - Join operation – set operation and aggregate operation – Relational Query Optimization – Transacting SQLqueries – Estimating the cost – Equivalence RuleS.	
	Total Lecture hours:	**45 hours**
Text Book(s)		
1.	Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", 6th Edition, Tata Mc Graw Hill, 2011.	
2.	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2017	
Reference Books		
1.	Toby Teorey, Sam Lightstone, Tom Nadeau, H. V. Jagadish, "DATABASE MODELINGAND DESIGN - Logical Design", Fifth Edition, Morgan Kaufmann Publishers, 2011.	
2.	Carlos Coronel, Steven Morris, and Peter Rob, Database Systems: Design, Implementation, and Management, Ninth Edition, Cengage learning, 2012	
3.	Thomas M. Connolly, Carolyn E. Begg, Database Systems A Practical Approach toDesign, Implementation, andManagement, Sixth Edition, Global Edition, Pearson Education, 2015.	
4.	Hector GarciaMolina, Jeffrey D Ullman, Jennifer Widom, "Database Systems:The Complete Book", 2nd edition, Pearson.	
5.	Raghu Ramakrishnan, "Database Management Systems", 4th Edition, Tata Mc Graw Hil l, 2010.	

Course Code	Course Title	L	T	P	J	C
22CST304	DATA STRUCTURES	3	0	2	0	4
		Syllabus version			v. 1.0	

Course Objectives:

1. To understand the concepts of ADTs.
2. To Learn linear data structures – lists, stacks, and queues.
3. To understand non-linear data structures – trees and graphs.
4. To understand sorting, searching and hashing algorithms.
5. To apply Tree and Graph structures.

Course Outcome:

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

1. Implement Linear data structure algorithms.
2. Implement applications using Stacks and Linked lists
3. Implement Binary Search tree and AVL tree operations.
4. Implement graph algorithms.
5. Analyze the various searching and sorting algorithms.

Unit-1	LISTS	9 hours
Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT-Radix Sort – Multilists.		

Unit-2	STACKS AND QUEUES	9 hours
	Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.	
Unit-3	**TREES**	**9 hours**
	Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – Priority Queue (Heaps) – Binary Heap.	
Unit-4	**MULTIWAY SEARCH TREES AND GRAPHS**	**9 hours**
	B-Tree – B+ Tree – Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth-first traversal — Bi-connectivity – Euler circuits – Topological Sort – Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm	

Unit-5	SEARCHING, SORTING AND HASHING TECHNIQUES	9 hours
Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort –Insertionsort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2005.
2.	Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007
Reference Books	
1.	Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++,2nd Edition, Pearson Education, 2015.
2.	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.
3.	Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms,1st edition, Pearson, 2002.

Course Code	Course Title	L	T	P	J	C
22HST301	ENTREPRENEURSHIP AND STARTUPS	2	0	0	0	2
		Syllabus version			v. 1.0	

Course Objectives:

1. To provide practical, proven tools for transforming an idea into a product or servicethatcreates value for others
2. To build a winning strategy, how to shape a unique value proposition, prepare a business plan
3. To impart practical knowledge on business opportunities
4. To inculcate the habit of becoming an entrepreneur
5. To know the financing, growth, and new venture & its problems

Course Outcome:

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

1. Transform ideas into real products, services, and processes by validating the idea, testingit, and turning it into a growing, profitable, and sustainable business.
2. Identify the major steps and requirements to estimate the potential of an innovative idea asthe basis of an innovative project.
3. Reach creative solutions via an iteration of a virtually endless stream of world- changingideas and strategies, integrating feedback and learning from failures alongthe way.
4. Apply the ten entrepreneurial tools in creating a business plan for a new innovative venture.

Apply methods and strategies learned from interviews with start-up entrepreneurs and innovators

Unit-1	**Entrepreneurial Competence**	**9 hours**
	Introduction to Entrepreneurship & Entrepreneur Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship, the role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management, and the Future of Entrepreneurship. The Entrepreneur: Means the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system.	
Unit-2	**Business Plan Preparation And Prototyping**	**9 hours**
	Business Opportunity Identification and Preparing a Business Plan Business ideas, methods of generating ideas, and opportunity recognition, Idea Generation Process, Feasibility study, preparing a Business Plan: Meaning and significance of a business plan, components of a business plan. Experimentation and incubation, Participation in Innovation & Co-creation, and Prototyping	
Unit-3	**Entrepreneurial Environment**	**9 hours**
	Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services - Central and State Government Industrial Policies and Regulations	
Unit-4	**Launching Of Small Business**	**9 hours**
	Financing & Launching the New Venture Importance of newventure financing, types of ownership, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks. Launching the New Venture: Choosing the legal form of the new venture, protection of intellectual property, andformation of the new venture.	
Unit-5	**MANAGEMENT OF SMALL BUSINESS**	**9 hours**
	Managing Growth & Rewards in New Venture Characteristics of high growth new ventures, strategies for growth, and building the new ventures. Managing Rewards: Exit Strategies for Entrepreneurs, Mergers and acquisitions, Succession and exit strategy, managing failures – bankruptcy - Business Sickness - Effective Management ofSmall Business - Case Studies.	
	Total Lecture hours:	**45 hours**
Text Book(s)		
1.	Stephen Key, "One Simple Idea for Start-ups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company", 1st Edition, Tata Mc Graw hillCompany,New Delhi, 2013.	

2.	Charles Bamford and Garry Bruton, "ENTREPRENEURSHIP: The Art, Science, and Process for Success", 2nd Edition, Tata Mc Graw hill Company, New Delhi, 2016.
Reference Books	
1.	Philip Auerswald, "The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy", Oxford University Press, 2012.
2.	Janet Kiholm Smith; Richard L. Smith; Richard T. Bliss, "Entrepreneurial Finance: Strategy, Valuation, and Deal Structure, Stanford Economics and Finance", 2011.
3.	Edward D. Hess, "Growing an Entrepreneurial Business: Concepts and Cases", Stanford Business Books, 2011.

Course Code	Course Title	L	T	P	J	C
22CSP301	**Data Structures Laboratory**	**0**	**0**	**3**	**0**	**2**
		Syllabus version			v. 1.0	

Course Objectives:

1. To understand the concepts of ADTs.
2. To Learn linear data structures – lists, stacks, and queues.
3. To understand non-linear data structures – trees and graphs.
4. To understand sorting, searching and hashing algorithms.
5. To apply Tree and Graph structures.

Course Outcome:

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

1. Implement Linear data structure algorithms.
2. Implement applications using Stacks and Linked lists
3. Implement Binary Search tree and AVL tree operations.
4. Implement graph algorithms.
5. Analyze the various searching and sorting algorithms.

LIST OF EXPERIMENTS:

1. Array implementation of Stack, Queue and Circular Queue ADTs
2. Implementation of Singly Linked List
3. Linked list implementation of Stack and Linear Queue ADTs
4. Implementation of Polynomial Manipulation using Linked list
5. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues
9. Implementation of Dijkstra's Algorithm
10. Implementation of Prim's Algorithm
11. Implementation of Linear Search and Binary Search
12. Implementation of Insertion Sort and Selection Sort
13. Implementation of Merge Sort

14. Implementation of Open Addressing (Linear Probing and Quadratic Probing)	
Total Lecture hours:	**45 hours**

Course Code	Course Title	L	T	P	J	C
22CSP302	**Database Management Systems Laboratory**	**0**	**0**	**3**	**0**	**2**
		Syllabus version			v. 1.0	

Course Objectives:

1. To learn and implement important commands in SQL., DDL and DML
2. To learn the usage of nested and joint queries.
3. To understand functions, procedures and procedural extensions of databases.
4. To understand design and implementation of typical database applications.

Course Outcome:

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

1. Create databases with different types of key constraints.
2. Construct simple and complex SQL queries using DML and DCL commands.
3. Use advanced features such as stored procedures and triggers and incorporate inGUI basedapplication development.
4. Create an XML database and validate with meta-data (XML schema).

LIST OF EXPERIMENTS:

1. Create a database table, add constraints, insert rows,update and delete rows using SQLDDL and DML commands.
2. Queries creating permission and granting permission using DDL AND DML
3. Queries using aggregate functions
4. Write PL/SQL program to swap two numbers, find the largest of three numbers, todisplay the number in reverse order, to accept a string and remove the vowels fromthe string. (When „hello‟ passed to the program it should display „Hll‟ removing eand o from the world Hello).
5. Write a program using procedures and functions
6. Write SQL Triggers for insert, delete, and update operations in a database table.
7. Case studies

Total Lecture hours:	**45 hours**

Course Code	Course Title	L	T	P	J	C
22EEP301	SOFT SKILLS	0	0	2	0	1
		Syllabus version			v. 1.0	

Course Objectives:

1. Do self-introspection and develop right attitude
2. Understand the self-motivation and mange his abilities with time
3. Understand the inter personal skills
4. Know the leader's qualities and develop as a leader
5. Understanding the conflict at work and make right decisions

Course Outcome:

1. Able to develop self-confidence through right attitude
2. Use self-motivation and to manage his abilities
3. Effectively use inter personal skills
4. Develop leadership qualities
5. Able to make right decisions and solving conflicts

Unit-1	**Self Analysis**	6 hours

Introduction, SWOT analysis, self-introspection, self confidence and self-esteem, Creativity -Out of the boxthinking, Creative thinking and Lateral thinking, Factors influencing attitude, Influence ofattitude on behaviour, Synergy between knowledge, skill and attitude,

Unit-2	**Growth Factors**	6 hours

Motivation, Motivational factors, Self-motivation, Intrinsic and extrinsic motivators, Goal setting, SMARTgoals, Short, long, life time goals, Time management, Value of time, Test your Time management skill, Prioritizing work, Time management matrix

Unit-3	**Interpersonal skills**	6 hours

Gratitude, Secret of happiness, Understanding the integration of leadership, networking and teamwork, situation analysis, Importance of teamwork, Teamwork activity, Stress Management-Causes of stress and itsimpact, how to manage and de-stress

Unit-4	**Leadership**	6 hours

Skills needed for a good leader, Types of leadership style, Assessment of leadership skills,Wheel ofleadership, Personal, social and professional etiquette Emotional intelligence, Emotional quotient and intelligence quotient, Emotion scale, Managing emotions

Unit-5	**Conflict resolution and Decision making**	6 hours

Conflicts in human relations, Self-assessment test for conflict management, Approaches to conflict resolution, Case study **Decision making-** Importance of decision making, Impact ofdecision in life, Processand practical way of decision making.	
Total Lecture hours:	30 hours
Text Book(s)	
1.	1. SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.
Reference Books	
1.	Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
2.	Carnegie Dale, How to Win Friends and Influence People, New York: Simon & Schuster, 1998.
3.	Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972.
4	Daniel Coleman, Emotional Intelligence, Bantam Book, 2006.
5	Carnegie Dale, How to stop worrying and start living, New York: Simon & Schuster, 1985.
6	http://empower.srmuniv.ac.in (online LMS)

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22BST401	**DISCRETE MATHEMATICS**	**3**	**2**	**0**	**0**	**4**
		Syllabus version		v. 1.0		

Course Objectives:

1. To extend student's logical and mathematical maturity and ability to deal with abstraction.
2. To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
3. To understand the basic concepts of combinatorics and graph theory.
4. To familiarize the applications of algebraic structures.
5. To understand the concepts and significance of lattices and Boolean algebra which are widelyused in computer science and engineering.

Course Outcome:

1. Have knowledge of the concepts needed to test the logic of a program.
2. Have an understanding in identifying structures on many levels.
3. Be aware of a class of functions which transform a finite set into another finite set which relatesto input and output functions in computer science.
4. Be aware of the counting principles.
5. Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

Unit-1	**LOGIC AND PROOFS**	**12 hours**

Propositional logic – Propositional equivalences - Predicates and quantifiers– Rules of inference - Introduction to proofs

Unit-2	COMBINATORICS	12 hours
Mathematical induction – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Inclusion and exclusion principle and its applications.		
Unit-3	**GRAPHS**	**12 hours**
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.		
Unit-4	**ALGEBRAIC STRUCTURES**	**12 hours**
Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Lagrange's theorem		
Unit-5	**LATTICES AND BOOLEAN ALGEBRA**	**12 hours**
Partial ordering – Po-sets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra		
	Total Lecture hours:	60 hours

TEXT BOOK(S)

1. Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub.Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications toComputer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCE BOOKS

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5thEdition, Pearson Education Asia, Delhi, 2013.
2. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw HillPub. Co. Ltd., New Delhi, 3rd Edition, 2010.

Course Code	Course Title	L	T	P	J	C
22CST401	FOUNDATIONS OF DATA SCIENCE	3	0	0	0	3
		Syllabus version			v. 1.0	

Course Objectives:

1. To understand the data science fundamentals and process.
2. To learn to describe the data for the data science process.
3. To learn to describe the relationship between data.
4. To utilize the Python libraries for Data Wrangling.
5. To present and interpret data using visualization libraries in Python

Course Outcome:

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

1. Define the data science process
2. Understand different types of data description for data science process
3. Gain knowledge on relationships between data
4. Use the Python Libraries for Data Wrangling
5. Apply visualization Libraries in Python to interpret and explore data

Unit-1	**INTRODUCTION**	9 hours
	Data Science: Benefits and uses – facets of data - Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – build the model– presenting findings and building applications - Data Mining - Data Warehousing – Basic Statistical descriptions of Data	
Unit-2	**DESCRIBING DATA**	9 hours
	Types of Data - Types of Variables -Describing Data withTables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores	
Unit-3	**DESCRIBING RELATIONSHIPS**	9 hours
	Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation ofr2– multiple regression equations –regression towards themean	

Unit-4	**PYTHON LIBRARIES FOR DATA WRANGLING**	9 hours
	Basics of Numpy arrays –aggregations –computations on arrays – comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables	
Unit-5	**DATA VISUALIZATION**	9 hours
	Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn.	
	Total Lecture hours:	45 hours

Text Book(s)	
1.	David Cielen, Arno D. B. Meysman, and Mohamed Ali, "IntroducingData Science", Manning Publications, 2016. (Unit I)
2.	Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units IIand III)
3.	Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Units IV andV)

Reference Books	
1.	Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press,2014.

Course Code	Course Title	L	T	P	J	C
22CST402	INTRODUCTION TO OPERATING SYSTEMS	3	0	0	0	3
		Syllabus version			v. 1.0	

Course Objectives:

1. To understand the basic concepts and functions of operating systems
2. To understand Processes and Threads
3. To analyse Scheduling algorithms
4. To understand the concept of Deadlocks
5. To analyse various memory management schemes
6. To understand I/O management and File systems
7. To be familiar with the basics of Linux system and Mobile OS like iOS and Android

Course Outcome:

Upon completion of the course, the students will be able to:

1. Use appropriate search algorithms for any AI problem
2. Represent a problem using first order and predicate logic
3. Provide the apt agent strategy to solve a given problem
4. Design software agents to solve a problem
5. Design applications for NLP that use Artificial Intelligence.

Unit-1	**OPERATING SYSTEM OVERVIEW**	9 hours
	Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation andSystem Boot.	
Unit-2	**PROCESS MANAGEMENT**	9 hours
	Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication ; CPU Scheduling – Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization –The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Criticalregions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.	

Unit-3	**STORAGE MANAGEMENT**	9 hours
	Mobile IP – DHCP – AdHoc – Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANETVs VANET – Security.	
Unit-4	**FILE SYSTEMS AND I/O SYSTEMS**	9 hours
	Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface – File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing andProtection; File System Implementation- File System Structure, Directoryimplementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.	
Unit-5	**CASE STUDY**	9 hours
	Linux System -Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS – iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OSLayer, File System.	
	Total Lecture hours:	45 hours

Text Book(s)

1.	S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, PrenticeHall, Third Edition, 2009.
2.	I. Bratko, ―Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

Reference Books

1.	M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science)‖, Jonesand Bartlett Publishers, Inc.; First Edition, 2008
2.	Nils J. Nilsson, ―The Quest for Artificial Intelligence‖, Cambridge University Press, 2009.
3.	William F. Clocksin and Christopher S. Mellish,‖ Programming in Prolog: Using the ISOStandard‖, Fifth Edition, Springer, 2003.
4.	Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2013.
5.	David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010

Course Code	Course Title	L	T	P	J	C
22CST403	Software Engineering	2	0	2	0	3
		Syllabus version			v. 1.0	

Course Objectives:

1. Understand the phases in a software project
2. Understand fundamental concepts of requirements engineering and Analysis Modelling.
3. Understand the major considerations for enterprise integration and deployment.
4. Learn various testing and maintenance measures

Course Outcome:

1. Identify the key activities in managing a software project.
2. Compare different process models.
3. Concepts of requirements engineering and Analysis Modeling.
4. Apply systematic procedure for software design and deployment.
5. Compare and contrast the various testing and maintenance.

Unit-1	SOFTWARE PROCESS AND PROJECT MANAGEMENT	6 hours

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis - Risk Management.

Unit-2	REQUIREMENTS ANALYSIS AND SPECIFICATION	6 hours

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

Unit-3	SOFTWARE DESIGN	6 hours

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

Unit-4	TESTING AND IMPLEMENTATION	6 hours

Software testing fundamentals-Internal and external views of Testing-white box testing- basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring.

Unit-5	**PROJECT MANAGEMENT**	**6 hours**
Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking – Relationship between people and effort, Task Set & Network, Scheduling, EVA - Process and Project Metrics.		
Total Lecture hours:		**30 hours**
Text Book(s)		
1.	Roger S. Pressman, "Software Engineering – A Practitioner‟s Approach", Seventh Edition, Mc Graw-Hill International Edition, 2010.	
Reference Books		
1	Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.	
2.	Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited ,2009.	
3.	Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010	

Course Code	Course Title	L	T	P	J	C
22EST401	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	2	0	0	0	2
		Syllabus version			v. 1.0	

Course Objectives:

5. To study the nature and facts about environment.
6. To finding and implementing scientific, technological, economic and political solutions to environmental problems.
7. To study the interrelationship between living organism and environment.
8. To appreciate the importance of environment by assessing its impact on the human world;envision the surrounding environment, its functions and its value.

5. To study the dynamic processes and understand the features of the earth‟s interior andsurface.
6. To study the integrated themes and biodiversity, natural resources, pollution control andwaste management

Course Outcome:

6. Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
7. Public awareness of environmental is at infant stage.
8. Ignorance and incomplete knowledge has lead to misconceptions
9. Development and improvement in std. of living has lead to serious environmental disasters

Unit-1	Environment, Ecosystems and Biodiversity	6 hours

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered andendemic species of India – conservation of biodiversity: In-situ and ex-situ.

Unit-2	Environmental Pollution	6 hours

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts .

Unit-3	Natural Resources	6 hours

Energy management and conservation, New Energy Sources: Need of new sources. Differenttypes new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

Unit-4	Social Issues and the Environment	6 hours
Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspectsof sustainability-from unsustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.		
Unit-5	**Human Population and the Environment**	**6 hours**
Population growth, variation among nations – population explosion – family welfare Programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.		
Total Lecture hours:		**30 hours**
Text Book(s)		
1.	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.	
2	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006	
3	Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.	
Reference Books		
1	Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi,2007.	
2.	Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015	

Course Code	Course Title	L	T	P	J	C
22CSP401	**DATA SCIENCE LABORATORY**	**0**	**0**	**3**	**0**	**1.5**
		Syllabus version			v. 1.0	
Course Objectives:						
1. To understand the python libraries for data science 2. To understand the basic Statistical and Probability measures for data science. 3. To learn descriptive analytics on the benchmark data sets. 4. To apply correlation and regression analytics on standard data sets. 5. To present and interpret data using visualization packages in Python.						
Course Outcome:						
At the end of this course, the students will be able to: 1. Make use of the python libraries for data science 2. Make use of the basic Statistical and Probability measures for data science. 3. Perform descriptive analytics on the benchmark data sets. 4. Perform correlation and regression analytics on standard data sets 5. Present and interpret data using visualization packages in Python.						

LIST OF EXPERIMENTS

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodels and Pandaspackages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doingdescriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes datasetfor performing thefollowing:
   i. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation,Skewness and Kurtosis.
   ii. Bivariate analysis: Linear and logistic regression modeling
   iii. Multiple Regression analysis
   iv. Also compare the results of the above analysis for the two data sets.
6. Apply and explore various plotting functions on UCI data sets.
   a) Normal curves
   b) Density and contour plots
   c) Correlation and scatter plots
   d) Histograms
   e) Three dimensional plotting
7. Visualizing Geographic Data with Basemap

Total Periods :	**45 Periods**

Course Code	Course Title	L	T	P	J	C
22CSP402	**OPERATING SYSTEMS LABORATORY**	**0**	**0**	**3**	**0**	**1.5**
		Syllabus version			v. 1.0	

Course Objectives:

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies

Course Outcome:

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

1. Compare the performance of various CPU Scheduling Algorithms
2. Implement Deadlock avoidance and Detection Algorithms
3. Implement Semaphores
4. Create processes and implement IPC
5. Analyze the performance of the various Page Replacement Algorithms
6. Implement File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

1. Installation of windows operating system
2. Illustrate UNIX commands and Shell Programming
3. Process Management using System Calls : Fork, Exit, Getpid, Wait, Close
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Illustrate the inter process communication strategy
6. Implement mutual exclusion by Semaphore
7. Write C programs to avoid Deadlock using Banker's Algorithm
8. Write a C program to Implement Deadlock Detection Algorithm
9. Write C program to implement Threading
10. Implement the paging Technique using C program
11. Write C programs to implement the following Memory Allocation Methods

    a. First Fit b. Worst Fit c. Best Fit
12. Write C programs to implement the various Page Replacement Algorithms
13. Write C programs to Implement the various File Organization Techniques
14. Implement the following File Allocation Strategies using C programs

    a. Sequential b. Indexed c. Linked
15. Write C programs for the implementation of various disk scheduling algorithms
16. Install any guest operating system like Linux using VMware.

Total Periods :	**45 Periods**

Course Code	Course Title	L	T	P	J	C
22EEP401	**QUANTITATIVE APTITUDE AND LOGICAL REASONING -1**	**0**	**0**	**2**	**0**	**1**
		Syllabus version			v. 1.0	

Course Objectives:

1. This module would train the students on the quick ways to solve quantitative aptitude problems and questions applying logical reasoning, within a short time span given duringtheplacement drives.

Course Outcome:

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

1. The student could able to analyze the problem in short time

LIST OF EXPERIMENTS:

1. Mock interviews on one-on-one basis
2. Quantitative aptitude
3. Partnership
4. Simple Interest, Compound Interest
5. Profit and Loss
6. Problems on Clock, Calendar and Cubes
7. Permutation and Combination
8. Allegation and mixtures
9. Logical Reasoning
10. Letter and Symbol series
11. Number series

12. Analyzing arguments
Making judgments