Curriculum and Syllabi

B.E. Computer Science & Engineering

Year 2020
Version 1.0

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY INSTITUTE OF ENGINEERING

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Programme Educational Objectives, Programme Specific Outcomes and Programme Outcomes

The Computer Science & Engineering faculty members have formulated the **Programme Educational Objectives** (PEOs). The PEOs are **broad statements** that describe the career and professional accomplishments that the program is preparing its graduates to achieve in few years (for example three years) subsequent to receiving the degree. The PEOs of the B.E. in Computer Science & Engineering Programme are as follows:

PEO-1   Graduate will be able to serve professionally while engaging with a Government firm, industry, corporate, academic and research organization or by contributing being an entrepreneur.

PEO-2   Graduate will be able to work effectively in different fields with a core expertise in analysis, design, networking, security, and development using advanced tools.

PEO-3   Graduate will be able to develop themselves professionally by continuous lifelong learning through innovation and research while benefitting the society.

| PEO-4 | Graduate will be able to show the leadership in diverse cultures, nationalities and fields while working with interdisciplinary teams. |
| PEO-5 | Graduate will be a committed team member through complacency and ethical values. |

Programme Specific Objectives (PSOs) are **specific statements** that describe the professional career accomplishments that the program is designed. The PSOs of the B.E. in Computer Science & Engineering Programme are as follows:

PSO-1	An effective skill set while demonstrating through programming and analytical skills.
PSO-2	Productivity in the relevant field while professionally even in diverse environment succeeding.
PSO-3	An ability to identify /develop/design solutions for Industry/Society Problems through their coding, database and networking skills
PSO-4	An ability to absorb and adopt the ever changing advance Technology in the field of C.S.E.

Programme Outcomes (POs) are **attributes of the graduates** of the programme that are indicative of the graduates' ability and competence to work as an engineering professional upon graduation. Program Outcomes are statements that describe what students are expected to know or be able to do by the time of graduation. They must relate to knowledge and skills that the students acquire from the programme. The achievement of all outcomes indicates that the student is well prepared to achieve the program educational objectives down the road. The following 12 POs have been chosen by the Computer Science & Engineering Department of Chandigarh University. The Computer Science & Engineering curriculum at CU has been designed to fully meet all the 12 Programme Outcomes:

PO 1.   Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO 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.

PO 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.

PO 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.

PO 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.

PO 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.

PO 7.   Environment and sustainability : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8.   Ethics : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9.   Individual and teamwork : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10.   Communication : Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend   and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11.   Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 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 to technological change.

The following sections describe the requirements for earning a B. Tech degree in Computer Science & Engineering and its break-down in terms of University Core courses, Program Core courses and electives at both the University and the Program levels.

SECTION 2

Curriculum for B.E. in Computer Science & Engineering Programme

COURSE CATEGORY-WISE CREDIT DISTRIBUTION

Summary of Credit Distribution 2020								MNG		
	HSM	BSC	ESC	PC	PE	OS	UC	MOOCs	Others	Graded Total
Sem-I	0	8	11	0	0	0	3	0	1	22
Sem-II	3	8	11	0	0	0	0	0	1	22
Sem-III	2	6	0	15	0	0	0	0	8	23
Sem-IV	2	5	0	19	0	0	0	4	1	26
Sem-V	0	0	1	21	3	0	0	0	2	25
Sem-VI	0	0	1	19	3	0	0	4	0	23
Sem-VII	0	0	0	9	3	3	0	0	4	15
Sem-VIII	0	0	0	3	6	3	0	4	0	12
Total	7	27	24	86	15	6	3	12	17	**168** (Excluding MNG)
								29		

HSM: Humanities Social Science and Management
BSC: Basic Science Courses
ESC: Engineering Science Courses
PC: Professional Core
PE: Professional Elective
OS: Open Subject
MNG: Mandatory Non-Graded
PS: Project/ Training

A. Break-Down of Credits

S.N.	Category	Number of Credits	Percentage Weightage
1	University Core	3	1.8%
2	University (Open) Elective	06	3.57%
3	Programme Core & Project	86	51.19%
4	Programme Elective	15	8.93%
5	Engineering Science	24	14.28%
6	Basic Sciences and Humanities	34	20.23%
	Total Credits	168	100%

B. Category-Wise Break-Down of Subjects

S.N.	Category	Number of Credits	Percentage Weightage
1	Engineering	110	65.47%
2	Sciences	26	15.47%
3	Management	4	2.40 %
4	Humanities	7	4.16%
5	Electives	21	12.5%
Total Number of Credits		168	100%

Descriptive Note to make understand the Key Players of the Department, who are involved in framing the Curriculum & Syllabus (C&S), BUT NOT TO BE PART of C&S i.e. to be deleted afterward.

The cumulative credits for all the courses falling in above categories (Table A & B) are to be calculated. Consider only those courses, which are mandatory for awarding the degree in a particulate programme of the study. We hope everyone understand the meaning of above terms, however, it is described hereunder for better clarity.

1. **University Core (UC):** All such courses (irrespective of kind/ class of courses like MNG etc.) which are being offered by the university as mandatory course irrespective programmes falling in respective standard of study like UG/PG/PhD, means the mandatory courses run for all UG students irrespective of UG programmes.

2. **University (Open) Elective (UE):** The minimum credits to be earned mandatorily at university level by students of respective standard of the study (UG/ PG/PhD) a programme by choosing course(s) from a list of courses.

3. **Programme Core (PC):** All such courses, which are being offered by the department/ division as mandatory course to be passed for the fulfilment of a particular programme.

4. **Programme Electives (PE):** All such courses, which are being offered by the department/ division as choice based optional course tending toward kind of specialization in sub domain of discipline and to be chosen from a basket of courses, and equivalent credit must be earned for the award of programmes.

   Please don't add any other row in above Table A, however, may add respective discipline-wise rows in Table B, as & where applicable.

Similarly, Category-wise Break-down of the Subjects:

1. Credits of all the courses/ subjects, which belongs to Category(ies) to Engineering must be added together, and to put in the column of 'Number of Credits' of the row 'Engineering' in above Table B. Similar calculation is to be done for other rows for Sciences/ Management/ Humanities. The department/ division may add other rows like medical etc. as applicable to the programme.

UNIVERSITY CORE COURSES

Credits to be Earned: 03

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20UCT141	Communication Skills	0	2	0	0	2	2		
2	20UCP142	Communication Skills Lab	0	0	2	0	1	2		
		Total	**0**	**2**	**2**	**0**	**3**	**4**		

* As an example for Subject Code as Notified by the Registrar (Ref. No./CU/R/19-20/7872 dt. Feb 15, 2020)

The terms (Abbreviations) are: **L** stands for Lecture, similarly, **T** for Tutorial, **P** for Practical (Labs), **S** for Skills Oriented Courses may be run in labs but with monitored by faculty (but under minimal no of faculty), **Sl** for Self-Learning, **St** for Studios, **C** for Credit(s), **CH** for Credit Hours.

Pre-requisite: The course(s), which is/are to be mandatorily passed out before opting for a course *(Only Course Code is to be written in the respective column of the concerned row)*.

Co-requisite: The course(s), which is/ are to be offered together in same semester *(Only Course Code is to be written in the respective column of the concerned row)*.

UNIVERSITY (OPEN) ELECTIVE COURSES

Credits to be Earned: 06

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CSO441	Cloud Computing	3	0	0	0	3	3		
	20CSO442	Programming in Python								
	20CSO443	Data Analytics								
	20CSO444	Database Management System								
2	20CSO481	Machine Learning	3	0	0	0	3	3		
	20CSO482	Operating System								
	20CSO483	Web Development								
	20CSO484	Computer Network								
		Total	**6**	**0**	**0**	**0**	**6**	**6**		

PROGRAMME CORE COURSES

Credits to be Earned: 88

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST211	Data Structures	3	0	0	0	3	3		
2	20CST212	Computer Organization & Architecture	3	0	0	0	3	3		
3	20CST214	Database Management System	3	0	0	0	3	3		
4	20CST218	Java Programming	2	0	0	0	2	2		
5	20CSP212	Data Structures Lab	0	0	4	0	2	4		
6	20CSP215	Database Management System Lab	0	0	2	0	1	2		
7	20CSP219	Java Programming Lab	0	0	2	0	1	2		
8	20CST252	Microprocessor & Interfacing	3	0	0	0	3	3		
9	20CST254	Software Engineering	3	0	0	0	3	3		
10	20CST256	Computer Networks	3	0	0	0	3	3		
11	20CST258	Principles of Artificial Intelligence	3	0	0	0	3	3		
12	20CSP259	Programming in Python Lab	0	0	4	0	2	4		
13	20CSR264	Project-I	0	0	1	3	2	4		
14	20CSP253	Microprocessor & Interfacing Lab	0	0	2	0	1	2		
15	20CSP255	Software Engineering Lab	0	0	2	0	1	2		

16	20CSP257	Computer Networks Lab	0	0	2	0	1	2		
17	20CSY225	Institutional/Summer Training: **MNG**	0	0	0	4	2	4		
18	20CST311	Design and Analysis of Algorithms	3	0	0	0	3	3		
19	20CST313	Operating Systems	3	0	0	0	3	3		
20	20CST315	System Programming	3	0	0	0	3	3		
21	20CST316	Machine Learning	3	0	0	0	3	3		
22	20CSR318	Project-II	0	0	1	5	3	6		
23	20CST319	Project Based Learning in Java	2	0	0	0	2	2		
24	20CSP312	Design and Analysis of Algorithms	0	0	2	0	1	2		
25	20CSP317	Machine Learning	0	0	2	0	1	2		
26	20CSP321	Project Based Learning in Java	0	0	4	0	2	4		
27	20CSX322	Institute/Industrial Summer Training : **MNG**	0	0	0	4	2	4		
28	20CST352	Network Operating System	3	0	0	0	3	3		
29	20CST353	Theory of Computation	3	0	0	0	3	3		
30	20CST354	INFORMATION SECURITY AND CRYPTOGRAPHY	3	0	0	0	3	3		
31	20CST355	MOBILE APPLICATION DEVELOPMENT	2	0	0	0	2	2		
32	20CST357	INTERNET OF THINGS	3	0	0	0	3	3		
33	20CSR359	Project-III	0	0	1	5	3	6		

34	20CSP356	MOBILE APPLICATION DEVELOPMENT	0	0	2	0	1	2		
35	20CSP358	INTERNET OF THINGS	0	0	2	0	1	2		
36	20CST411	Cloud Computing	3	0	0	0	3	3		
37	20CST412	BLOCKCHAIN Technology	3	0	0	0	3	3		
38	20CSR414	Project-IV	0	0	1	5	3	6		
39	20CSI415	Industrial Summer Training	0	0	0	4	2	4		
40	20CSR451	Project-V	0	0	1	5	3	6		
41	20CSYBBB	EMPLOYABILITY ENHANCEMENT COURSES - **MNG**	1	0	0	0	1	1		
Total			**57**	**0**	**35**	**35**	**92**			

PROGRAMME ELECTIVE COURSES

Credits to be Earned: 15

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST331/20CSP336	STATISTICAL INFERENCE USING R	2	0	2	0	3	4		
	20CST332/20CSP337	SOFT COMPUTING								
	20CST333/20CSP338	WEB AND MOBILE SECURITY								

	20CST334/20CSP339	MULTIMEDIA TECHNOLOGIES								
2	20CST371/20CSP376	DATA MINING	2	0	2	0	3	4		
	20CST372/20CSP377	DEEP LEARNING								
	20CST373/20CSP378	WEB TECHNOLOGIES								
	20CST374/20CSP379	UI/UX DESIGN								
3	20CST431/20CSP436	BUSINESS INTELLIGENCE	2	0	2	0	3	4		
	20CST432/20CSP437	COMPUTER VISION								
	20CST433/20CSP438	Software Testing and Quality Assurance								
	20CST434/20CSP439	Digital Image Processing								
4	20CST461	DATA VISUALIZATION	2	0	2	0	3	4		
	20CST462	NATURAL LANGUAGE PROCESSING								
	20CST463	SEARCH ENGINE OPTIMIZATION								
	20CST464	WIRE FRAMING AND UI PROTOTYPING								
5	20CST471	BIG DATA ANALYTICS	2	0	2	0	3	4		
	20CST472	ROBOTIC PROCESS AUTOMATION								
	20CST473	AR/VR SIMULATION								
	20CST474	COMPUTER GRAPHICS								

	Total	10	0	10	0	15		

SEMESTER-WISE COURSE-STRUCTURE

First Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20SMT125	Mathematics for Computing	0	4	0	0	4	4		
2	20SPT141	Quantum and Semi Conductor Physics	3	0	0	0	3	3		
3	20ELT111	Basic Electrical and Electronics Engineering	3	0	0	0	3	3		
4	20CST111	Problem Solving with Programming	0	2	0	0	2	2		
5	20UCT141	Communication Skills	0	2	0	0	2	2		
6	20MEP114	Computer Graphics using CAD Lab	0	1	2	0	2	3		
7	20SPP142	Quantum and Semi Conductor Physics Lab	0	0	2	0	1	2		
8	20ELP112	Basic Electrical and Electronics Engineering Lab	0	0	2	0	1	2		
9	20CSP112	Problem Solving with Programming Lab	0	0	4	0	2	4		
10	20UCP142	Communication Skills Lab	0	0	2	0	1	2		
11	20ECP114	Foundations of Internet of Things Lab	0	0	2	0	1	2		
12	20UCY146	Life Skill and Mentoring-1	0	1	0	0	1	1		

		Total	6	9	14	0	22	-		

Second Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20SMT175	Calculus and Vector Spaces	3	2	0	–	5	5		
2	20SZT188	Biology For Engineers	3	0	0	–	3	3		
3	20ECT155	Digital Electronics	3	0	0	–	3	3		
4	20CST151	Object Oriented Programming using C++	0	2	0	–	2	2		
5	20PCT154	Professional Communication Skills	0	2	0	–	2	2		
6	20ECP158	Applied Digital Electronics Lab	0	0	2	–	1	2		
7	20CSP152	Object Oriented Programming using C++ Lab	0	0	4	–	2	4		
8	20PCP158	Professional Communication Skills Lab	0	0	2	–	1	2		
9	20MEP156	Workshop Practice Trades (CSE, ECE, EE) (Fitting Shop, Electrical Shop, Electronics Shop)	0	1	2	–	2	3		
10	20ECP153	Foundations of Artificial Intelligence Lab	0	0	2	–	1	2		
11	20UCY196	Life Skills and Mentoring-2	0	1	0	–	1	1		
		Total	9	7	12	0	22			

Third Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST211	Data Structures	3	0	0	0	3	3		
2	20CST212	Computer Organization & Architecture	3	0	0	0	3	3		
3	20CST214	Database Management System	3	0	0	0	3	3		
4	20SMT216	Numerical & Optimization Techniques	3	1	0	0	4	4		
5	20TDT202	Aptitude	0	2	0	0	2	2		
6	20CST218	Java Programming	2	0	0	0	2	2		
7	20CSP212	Data Structures Lab	0	0	4	0	2	4		
8	20CSP215	Database Management System Lab	0	0	2	0	1	2		
9	20CSP219	Java Programming Lab	0	0	2	0	1	2		
10	20UCT221	Introduction to Management and Leadership	2	0	0	0	2	2		
11	20UCY222	Life Skills and Mentoring : MNG	0	1	0	0	1	1		
12	20SMY223	Bridge Course For Engineering Students (LEET) : MNG	3	1	0	0	4	4		
13	20UCX224	Entrepreneurship : MNG	0	0	0	2	1	0		
14	20CSY225	Institutional/Summer Training: MNG	0	0	0	4	2	0		
Total			**18**	**1**	**8**	**6**	**23**			

Fourth Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20TDP251	Soft Skills	0	0	2	0	1	2		
2	20CST252	Microprocessor & Interfacing	3	0	0	0	3	3		
3	20CST254	Software Engineering	3	0	0	0	3	3		
4	20CST256	Computer Networks	3	0	0	0	3	3		
5	20CST258	Principles of Artificial Intelligence	3	0	0	0	3	3		
6	20CSP259	Programming in Python Lab	0	0	4	0	2	4		
7	20UCT213	Creativity and Critical Thinking	2	0	0	0	2	2		
8	20CSR264	Project-I	0	0	1	3	2	4		
9	20SMT216	Probability and Statistics	3	1	0	0	4	4		
10	20CSP253	Microprocessor & Interfacing Lab	0	0	2	0	1	2		
11	20CSP255	Software Engineering Lab	0	0	2	0	1	2		
12	20CSP257	Computer Networks Lab	0	0	2	0	1	2		
13	20CSM266	MOOCS* (NON CREDITED)	0	0	0	0	4	8		
14	20CSYBBB	EMPLOYABILITY ENHANCEMENT COURSES - **MNG**	1	0	0	0	1	1		
15	20UCY265	Life Skills and Mentoring : **MNG**	0	1	0	0	1	1		
Total			**17**	**1**	**13**	**3**	**26**			

Fifth Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST311	Design and Analysis of Algorithms	3	0	0	0	3	3		
2	20CST313	Operating Systems	3	0	0	0	3	3		
3	20CSP314	Competitive Coding - I	0	0	2	0	1	2		
4	20CST315	System Programming	3	0	0	0	3	3		
5	20CST316	Machine Learning	3	0	0	0	3	3		
6	20CST3**	Professional Elective-I	2	0	0	0	2	2		
7	20CSR318	Project-II	0	0	1	5	3	6		
8	20CST319	Project Based Learning in Java	2	0	0	0	2	2		
9	20CSP312	Design and Analysis of Algorithms	0	0	2	0	1	2		
10	20CSP317	Machine Learning	0	0	2	0	1	2		
11	20CSP3**	Professional Elective-I	0	0	2	0	1	2		
12	20CSP321	Project Based Learning in Java	0	0	4	0	2	4		
13	20CSX322	Institute/Industrial Summer Training : MNG	0	0	0	4	2	4		
14	20TDY301	Soft Skills :MNG	**0**	**0**	**2**	0	1	2		
15	20TDY302	Aptitude: MNG	0	2	0	0	2	2		
Total			**16**	**0**	**13**	**5**	**25**			

Sixth Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CSP351	Competitive Coding – II	0	0	2	0	1	2		
2	20CST352	Network Operating System	3	0	0	0	3	3		
3	20CST353	Theory of Computation	3	0	0	0	3	3		
4	20CST354	INFORMATION SECURITY AND CRYPTOGRAPHY	3	0	0	0	3	3		
5	20CST355	MOBILE APPLICATION DEVELOPMENT	2	0	0	0	2	2		
6	20CST357	INTERNET OF THINGS	3	0	0	0	3	3		
7	20CST3**	**Professional Elective-II**	2	0	0	0	2	2		
8	20CSR359	Project-III	0	0	1	5	3	6		
9	20CSP356	MOBILE APPLICATION DEVELOPMENT	0	0	2	0	1	2		
10	20CSP358	INTERNET OF THINGS	0	0	2	0	1	2		
11	20CSP3**	**Professional Elective-II**	0	0	2	0	1	2		
12	20CSM361	MOOCS* (NON CREDITED)	0	0	0	8	4	8		
13	20TDY351	Soft Skills : MNG	0	0	2	0	1	2		
14	20TDY352	Aptitude : MNG	0	2	0	0	2	2		
		Total	**16**	**0**	**9**	**5**	**23**			

Seventh Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST4**	**Professional Elective-III**	2	0	0	0	2	2		
2	20CST411	Cloud Computing	3	0	0	0	3	3		
3	20**O4**	Open Elective-I	3	0	0	0	3	3		
4	20CST412	BLOCKCHAIN Technology	3	0	0	0	3	3		
5	20CSR414	Project-IV	0	0	1	5	3	6		
6	20CSP4**	**Professional Elective-III**	0	0	2	0	1	2		
7	20CSI415	Industrial Summer Training	0	0	0	4	2	4		
8	20CST413	Environmental Science and Disaster Management	2	0	0	0	2	2		
Total			**11**	**0**	**3**	**5**	**15**			

Eighth Semester

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST4**	**Professional Elective-IV**	2	0	2	0	3	4		
2	20CST4**	**Professional Elective-V**	2	0	2	0	3	4		
3	20**O4**	Open Elective-II	3	0	0	0	3	3		
4	20CSR451	Project-V	0	0	1	5	3	6		
5	20CSM452	MOOCS* (NON CREDITED)	0	0	0	8	4	8		
Total			**7**	**0**	**5**	**5**	**12**			

Syllabi for Common Courses

Syllabi & Courses Offered from Basic Engineering Sciences

List of Basic Engineering Sciences Courses

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20MEP148	Computer Graphics using CAD Lab	0	1	2	0	2	3		
2	20TDT202	Aptitude	0	2	0	0	2	2		
3	20TDP251	Soft Skills	0	0	2	0	1	2		
4	20ELT111	Basic Electrical and Electronics Engineering	3	0	0	0	3	3		
5	20CST145	Problem Solving with Programming	0	2	0	0	2	2		
6	20CSP314	Competitive Coding - I	0	0	2	0	1	2		
7	20CSP351	Competitive Coding – II	0	0	2	0	1	2		

8	20ELP118	Basic Electrical and Electronics Engineering Lab	0	0	2	0	1	2		
9	20CSP145	Problem Solving with Programming Lab	0	0	4	0	2	4		
10	20ECP114	Foundations of Internet of Things Lab	0	0	2	0	1	2		
11	20ECT165	Digital Electronics	3	0	0	0	3	3		
12	20CST157	Object Oriented Programming using C++	0	2	0	0	2	2		
13	20ECP158	Applied Digital Electronics Lab	0	0	2	0	1	2		
14	20CSP157	Object Oriented Programming using C++ Lab	0	0	4	0	2	4		
15	20MEP161	Workshop Practice	0	1	2	0	2	3		
16	20ECP153	Foundations of Artificial Intelligence Lab	0	0	2	0	1	2		
17	20TDY301	Soft Skills :MNG	**0**	**0**	**2**	0	1	2		
18	20TDY302	Aptitude: MNG	0	2	0	0	2	2		
19	20TDY351	Soft Skills : MNG	0	0	2	0	1	2		
20	20TDY352	Aptitude : MNG	0	2	0	0	2	2		
Total			**6**	**6**	**30**	**0**	**27**	**-**		

Syllabi & Courses Offered from Basic & Applied Sciences

List of Basic & Applied Sciences Courses

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20SMT125	Mathematics for Computing	0	4	0	0	4	4		
2	20SPT141	Quantum and Semi Conductor Physics	3	0	0	0	3	3		
3	20SPP142	Quantum and Semi Conductor Physics Lab	0	0	2	0	1	2		
4	20SMT216	Numerical & Optimization Techniques	3	1	0	0	4	4		
5	20SMT216	Probability and Statistics	3	1	0	0	4	4		
6	20SMY223	Bridge Course For Engineering Students (LEET) : **MNG**	3	1	0	0	4	4		
7	20SMT175	Calculus and Vector Spaces	3	2	0	0	5	5		
8	20SZT198	Biology For Engineers	3	0	0	0	3	3		
Total			**18**	**9**	**2**	**0**	**28**	**29**		

20SMT125	COMPUTATIONAL MATHEMATICS	L	T	P	S	C	CH
Version 1.00		0	4	0	0	4	60
Pre-requisites/ Exposure	Knowledge of mathematics up to senior secondary level						
Co-requisites	-						

COURSE OBJECTIVES

The Course aims to:

Impart analytical ability in solving mathematical problems as applied to therespective branch of Engineering.

COURSE OUTCOMES

On completion of this course, the students are expected to

1.	(i)Apply the fundamental mathematical concepts and terminology related to various types of sets, relations and functions.

(ii). Evaluate the rank of matrix and apply this concept in real life problems.Write original short compositions, in the form of paragraph writing, business correspondence, blogs etc. through logical support and argument.

2.	(i).Apply and analyzerecursive relations and generating functions.

	(ii) Evaluatethe problemsrelating permutation and combination.

3.	(i) Analyze the different types of graphs as well as the tree & paths and difference between them such as binary/spanning/minimal spanning/ traversal trees.

(ii) Apply the strategies of optimization in game theory.

COURSEDESCRIPTION

The course begins with the introduction of set theory which is widely utilized in all engineering applications. The students are then introduced to Matrix algebra and its appli8cations in real life. The course further emphasizes on the concept of basic counting principle, graph theory and trees. Then the students are introduced optimization technique with the help of game theory.

TEXT BOOKS

T1	C.L. Liu "Elements of Discrete Mathematics". McGraw Hill, 3rd Edition.

T2   Santha,"Discrete Mathematics with Graph Theory, Cengage Learning, 1st Edition.
T3   G. Ronald, Knuth, Donald and Patashik, Oren, " concrete Mathematics: A Foundation for Computer Science ", Addison-Wesley.

REFERENCE BOOKS

R1   B. Kolaman,and R.C. Busby,"DiscreteMathematicalStructures", PHI, 1stEdition.
R2   Gersting, L. Judith"MathematicalStructuresfor computerScience",ComputerSciencePress.
R3   DoerrandLevasseur,"AppliedDiscerteStructureforComputerScience".
R4   Tembley&Manohar,"DiscreteMathematicalStructures with Applications toComputers",Mc Graw Hill.
R5   K.H. Rosen,"DiscreteMathematics anditsapplications" Mc-Grew hill.
R6   NChSNLyengar. V.M. Chandrasekaran, "DiscreteMathematics".

COURSE CONTENT

Unit I: Basic Structure   **20 Contact Hours**

Introductiontoset theory, Set operations, Algebraof sets,Combination ofsets,Duality,FiniteandInfinitesets, Cardinality of setsClassesofsets,Powersets,Minsets&Maxsets,Cartesian product,Principlesofinclusion&exclusion.

Relations and functions: Binary relations, types of relations, equivalence relations and partitions,partialorderrelations,functionsandits types, compositionoffunction andrelations,inverse of relationsand functions.

Matrix Algebra: Introduction, Types of Matrices, Rank of matrix, Solution of linear equations-Gauss elimination, Jacobi and Gauss Seidal, Eigen values and Eigen vectors

Unit II: Basics of Computing   **20 Contact Hours**

The Foundations: Logic and Proofs: Basic operations:AND (^)OR (ᵛ), NOT(-) Truthvalueofa compound statements, propositions, tautologies,contradictions, Applications of Propositional, Propositional equivalences, Predicates and quantifiers, Rules of Inference.

Counting Techniques: Recursive definitions,Recurrencerelations with constantcoefficients,homogeneous andparticularsolutions, solutions of recurrencerelation usinggeneratingfunctions. Fibonacci Series, Divide-and-Conquer Algorithms.

Permutations and combinations: Linear permutation and circular permutation, Combination.Pigeon hole principle.

Unit III: Advanced Theories   **20 Contact Hours**

Lattices: Introduction, Properties of Lattices, Sub-Lattices, Homomorphism and isomorphism, Hasse diagram.

Graph Theory: Introduction to graphs, directed and undirected graphs, homomorphic and isomorphic graphs, sub graphs multi graphs and weighted graphs, paths and circuits, shortest path in weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, planer graphs Euler's formula.

Trees: Introduction to trees, difference between graphs and a tree rooted trees, path length in trees, spanning trees & cut-sets, minimum spanning trees, binary trees and its traversal.

Game Theory: Pay of Matrix, Mini-Max criteria, Saddle points, Optimal Strategy, Mixed Strategy, Value of game.

MODE OF EVALUATION: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)

1	(i) Apply thefundamentalmathematicalconcepts andterminologyrelated tovarious types of sets,relations and functions. (ii) Evaluate the rank of matrix and apply this concept in real life problems.	1 to 5, 12
2	(i) Apply andanalyzerecursiverelations and generating functions. (ii) Evaluatetheproblemsrelating permutation and combination.	1 to 5, 12
3	(i) Analyze thedifferenttypesofgraphs aswellasthe tree&paths anddifferencebetween themsuchasbinary/spanning/minimal spanning/ traversal trees. (ii) Apply the strategies of optimization in game theory.	1 to 5, 12

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20SMT125	Computational Mathematics	3	2	2	1	1	0	0	0	0	0	0	1

1=addressed to small extent

2= addressed significantly

3=major part of course

20SPT141 (Odd Sem) 20SPT181 (Even Sem)	Quantum & Semiconductor Physics	L	T	P	S	C	CH
Version1.00		3	0	0	0	3	3
Pre-requisites/ Exposure	Physics and Mathematics (10+2 level)						
Co-requisites							

COURSE OBJECTIVES

1.   The course is designed to make the students industry ready to contribute in the growing demand of the industry at local, national and international level.

2.   It will make the students competent to understand basic concepts and applications of advanced engineering physics and apply its principles in their respective fields at global platform.

3.   It will enhance the skill level of the students and shall make them preferred choice for getting employment in industry and research labs.

4.   It will give thorough knowledge of the discipline to enable students to disseminate knowledge in pursuing excellence in academic areas.

COURSE OUTCOMES

On completion of this course, the students are expected to learn

1. The basic concepts of semiconductor physics, illustrate the working of various semiconductor components and use its principles in design of devices and its applications.
2. To identify various components of laser and optical fibres and justify their importance and applications in different fields of computer science and technology
3. To explain the basic concepts of quantum mechanics, use its principles in solving quantum mechanical problems and recommend its applications in quantum computing and nanotechnology.

COURSE DESCRIPTION

The course begins with the study of basic crystal structure of solids and then extended to semiconductors. The students will learn to apply the principles in design of various semiconducting components. The students are then introduced to the applications of laser and fiber optics which are the pillars of communication system. Then the students are introduced to the concepts of quantum mechanics and its application in quantum computing and nanotechnology.

TEXTBOOKS

T1.   Malik H.K, Singh A.K. (2011) Engineering Physics, TMH, New Delhi. ISBN: 9780070671539
T2.   Beiser A. (2002) Concepts of Modern Physics, McGraw Hill Education. ISBN: 9780070495531
T3.   Sadiku M.N.O. (2007) Elements of Electromagnetics, Oxford University Press. ISBN: 0195300483
T4.   C. T. Bhunia (2010) Introduction to Quantum Computing, New Age International   Publishers **ISBN** 978-8122430752
T5.   Sze S.M., K. Ng Kwok., Physics of Semiconductor Devices, Edition 3rd , (2011), Wiley India.   KasapS.O., Principles of Electronic and materials and devices, Edition 1st, (2007), Tata McGraw-Hill, Noida.

REFERENCE BOOKS
R1.   Griffith D.J. (2012) Introduction to Electromagnetics, PHI Learning, 4th edition, ISBN: 9780138053260.
R2.   Ghatak A. (2012) Optics, McGraw Hill Education. ISBN: 978-1259004346.

R3.   Sahni V., Goswami D. (2008) Nano Computing, McGraw Hill Education Asia Ltd., ISBN: 978007024892Beiser A., Ghatak A,   Garg S.C., Applied Physics, Edition 1st, (2013), Tata McGraw-Hill, Noida.

COURSE CONTENT

Unit I: Basics of Semiconductor Physics	15 Contact Hours

CRYSTALLOGRAPHY: Basic terms, types of crystal systems, Bravais lattices, Miller Indices, d-spacing, atomic packing factor for SC, BCC, FCC and HCP structures.

SEMICONDUCTOR PHYSICS & DEVICES: Basics of Semiconductor-Physics, Classical free electron theory and quantum free electron theory, Formation of energy bands in metals, semiconductors & insulators, Direct & Indirect Band Gap Materials, Fermi-Dirac Function, Position of Fermi level in intrinsic and extrinsic semiconductors, Conductivity, Mobility, Current density (drift & diffusion) in semiconductors (n-type and p-type), Generation and recombination of charges, Fermi Level diagram for p-n junction (unbiased, forward bias, reverse bias), formation of p-n junction diode, Zener-diode, Hall effect and Hall voltage, LED, Organic LED, Applications of semiconductor devices.

Unit II: Lasers and Fibre Optics	15 Contact Hours

LASERS - Introduction, Spontaneous and Stimulated emission of radiation, Relation b/w Einstein's A and B coefficients, Population inversion & types of pumping, Main components of a Laser, Construction & working of Ruby Laser and its applications, Construction & working of Helium-Neon laser and its applications. Holography: Elementary idea of holography and constructive and reconstructive of holography.

FIBRE OPTICS :Fundamental ideas about optical fibre, Types of fibres, Acceptance angle and cone, Numerical aperture, Propagation mechanism and communication in optical fibres, Attenuation and losses

Unit III: Quantum Mechanics	15 Contact Hours

QUANTUM MECHANICS: Introduction of quantum physics- Planck's radiation theory, Wien displacement law, Rayleigh Jean law, Compton effect, Heisenberg's uncertainty principle, Wave particle duality, de Broglie wavelength, properties of matter waves, wave packet, phase velocity and group velocity, wave function, physical significance of wave function, Schrödinger's wave equation (Time Independent And Dependent), Motion of free particle, Particle in a box.

INTRODUCTION TO QUANTUM COMPUTING - Introduction to Nanotechnology, applications of nanotechnology, History of Computing, Quantum wire, Quantum well, Quantum dot,, Sol-Gel technique, Quantum Computers, Nanocomputing Technologies, Nano Information Processing, Prospects and Challenges

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment(CAE)	Semester End Examination(SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes(POs)

S No.	Course Outcome(CO)	Mapped Programme Outcome(PO)
1	The basic concepts of semiconductor physics, illustrate the working of various semiconductor components and use its principles in design of devices and its applications.	1,2,3,4,5,11
2	To identify various components of laser and optical fibres and justify their importance and applications in different fields of computer science and technology	1,2,5,6,11
3	To explain the basic concepts of quantum mechanics, use its principles in solving quantum mechanical problems and recommend its applications in quantum computing and nanotechnology.	1,2,3,4,5,6,11

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	11
20SPT141(Odd Sem) 20SPT181 (Even Sem)	Quantum & Semiconductor Physics	3	2	2	1	1	1	0	0	0	0	0	2

1=addressed to small extent

2=addressed significantly

3=major part of course

20ELT111 (Odd Sem) 20ELT151 (Even Sem)	Basic Electrical and Electronics Engineering (BEEE)	L	T	P	S	C	CH
Version 1.00		3	1	0	0	4	0
Pre-requisites/ Exposure	Physics (10+2 level)						
Co-requisites							

COURSE OBJECTIVES

The course should enable the student to

1.   understand Electrical & Electronics Engg. Fundamentals.
2.   acquire specific knowledge and skills so as to comprehend how electric, magnetic and electronic circuits are applied in   practice.

COURSE OUTCOMES

The course should enable the student to
1.   describe the performance of an electric circuit as well as solving both single phase and three-phase AC circuits in sinusoidal steady state.
2.   predict about electrical safety and implementation of electric wiring.
3.   illustrate various rotating electric machines, with application of motors in particular, transducers and electric batteries
4.   identify and explain various components of electronics and digital systems.
5.   justify operation of logic gates.
6.   construct interfacing of A/D and D/A converter.

COURSE DESCRIPTION

The course starts with an insight to DC & AC circuits, from understanding basic laws to design and analysis of electrical circuits (including magnetic circuits like transformers). Students are then introduced to transducers & DC motors from the perspective of use in real world. The course further emphasizes upon the design and analysis of digital electronic circuits.

TEXT BOOKS

1.   Basic Electrical Engineering, Nagrath, 2001, McGraw-Hill Education (India) PvtLimited
2.   Basic Electrical and Electronics Engineering, Bhattacharya, S.K., 2011, Pearson
3.   Electronic Devices and Circuit Theory, Boylestad, 2009, Pearson
4.   Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad ,2000, PHI
5.   A course in Electrical & Electronics Measurement and Instrumentation, A K Sawhney, 2014, Dhanpat Rai.
6.   Battery Reference book, Thomas Crompton, Newnes, 3rdedition,2000.

REFERENCE BOOKS

1.   Electric Circuits, Charles K. Alexander & Matthew N. O. Sadiku, 4th edition,McGraw-Hill. Publication
2.   Electrical Engineering Fundamentals, Vincent Del Toro, 2nd edition, Prentice Hall ofIndia
3.   Electronic Principles, Albert Paul Malvino , (6th edition),T.M.H., 1993
4.   Digital Design, M. M. Mano, Pearson Publications, 2007
5.   Electric Machines, Ashfaq Hussain, 3rdEdition, Dhanpat Rai

COURSE CONTENT

Unit I: Electrical Circuits and Safety   **15 Contact Hours**

DC & AC Circuits: Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Ideal sources –equivalent resistor, current division, voltage division, Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, Analysis of R-L, R-C circuits

Magnetic Circuits and Transformers: Magnetic effects of electric current, Law of Electromagnetic Induction, Self-Inductance, Mutual Inductance, Single Phase Transformer: Construction, Working principle, Efficiency

Electrical safety and wiring: Safety measures in electrical system, types of wiring, Difference between grounding and earthing, Basic principles of earthing, components of earthing system

Unit II: Motors, transducers & batteries	15 Contact Hours

Rotating Electrical Machines: Operating characteristics of DC motor, working principle, construction and applications of Induction motor, Brushed DC motor, Geared DC motor, Brushless DC motors, Servo Motors, Stepper motors, Linear DC motor

Transducers: Principle of sensing, Basic requirements of transducers, classification of transducers, passive transducers: capacitive, inductive, LVDT, potentiometric, strain gauge, thermistor, Hall-Effect, Active transducers: piezoelectric, photoelectric and thermocouple, Tri-axial Sensors: Gyroscopes, Accelerometers, Magnetometers.

Batteries: Selecting Battery: Basic Battery Specifications, common parameters of battery/applications, Different types of Batteries used in different applications, Power Supplies: Linear and SMPS

Unit III: Electronic Devices & Circuits	15 Contact Hours

Semiconductor Devices: Review of Electronic Devices and applications: PN Junction Diode, Rectifiers, Zener Diode, Bipolar Junction Transistor, MOSFET. Analog and Digital signals, Sampling and Quantization, Amplifier characteristics, Feedback concept, positive and negative feedback, Oscillators, D/A and A/D converters.

Digital Electronics: Number systems –Binary, decimal, binary arithmetic, logic gates, implementation of Boolean expressions using logic gates, Digitization and its advantages, basic introduction of flip-flops, counters , multiplexers, demultiplexers, encoders, decoders and their applications, Data Acquisition System.

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	**Continuous Internal Assessment (CAE)**	**Semester End Examination (SEE)**
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	**Course Outcome (CO)**	**Mapped Programme Outcome (PO)**
1	describe the performance of an electric circuit as well as solving both single phase and three-phase AC circuits in sinusoidal steady state.	1,2,3
2	predict about electrical safety and implementation of electric wiring.	1,2,3
3	illustrate various rotating electric machines, with application of motors in particular, transducers and electric batteries	1, 2,3
4	identify and explain various components of electronics and digital systems.	1,2,4
5	justify operation of logic gates.	1,2,3,4
6	construct interfacing of A/D and D/A converter.	1,2,3,4,5

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20ELT111 **20ELT151**	**Basic Electrical and Electronics Engineering**	3	3	2	1	1							1

1=addressed to small extent

2= addressed significantly

3=major part of course

20CST111	Problem Solving with Programming	L	T	P	S	C	CH
Version 1.00		0	2	0	0	2	
Pre-requisites/ Exposure	Basic mathematics and computation						
Co-requisites							

COURSE OBJECTIVES
1.   The course aims to provide exposure to problem-solving through programming.
2.   The course aims to raise the programming skills of students via logic building capability.
3.   With knowledge of C programming language, students would be able to model real world problems.

COURSE OUTCOMES
On completion of this course, the students are expected to

1.   Identify situations where computational methods would be useful.
2.   Approach the programming tasks using techniques learnt and write pseudo-code
3.   Choose the right data representation formats based on the requirements of the problem.
4.   Use the comparisons and limitations of the various programming constructs and choose the right one for the task.

COURSEDESCRIPTION
The course begins with the introduction to Basic concepts of programming and its applications in numerous fields. After covering fundamentals, students will learn how to apply the more complex concepts including loops and arrays in order to solve the complex real world problems.

TEXT BOOKS
T1   Programming in ANSI C by E. Balaguruswamy, Tata McGraw Hill.

T2   Programming in C Ansi standard, by Yashwant Kanetkar, BPB Publications.

REFERENCE BOOKS

R1   Programming with C (Schaum's Outline Series) by Byron Gottfried Jitender Chhabra, Tata McGraw Hill.

R2   C Programming Language by Brian W. Kernighan, Dennis Ritchie, Pearson education.

R3   C How to program by Harvey Deital, 8th edition

COURSE CONTENT

Unit I: Introduction to basic building blocks to programming   **10 Contact Hours**

Introduction: Flow charts and Algorithms, Memory layout of a C program.
Fundamentals of C: Features & Applications of C language, structure of writing a C Program, I/O functions in C, Indentation, Comments, Header Files, Data Types, Constants and Variables, Operators, Expressions, Evaluation of expressions, Type Conversion, Precedence and Associativity.
Decision Control structure in C: Decision making statements (if, if-else, if-else-if, switch), nesting of decision control structures.

Unit II: Dealing with real-world problems   **10 Contact Hours**

Loop Control structure in C: Looping statements (for, while, do-while), nested loop, use of jumping statements (goto, break, continue).
Array & String: Concepts of array, one and two dimensional arrays, declaration and initialization of arrays, searching and sorting, string handling, string storage.
Functions: Concepts of library functions, Built-in-string functions, user defined functions, prototypes, definition of function, parameters types, parameter passing, calling a function, recursive function, Macros.

.**Unit III: Handling heterogeneous data and memory management**   **10 Contact Hours**

Pointers: Basics of pointers, double pointer, smart pointers, pointer and array, pointer to array, array of pointers, functions returning a pointer, storage classes.

Structure: Basics of structure, structure members, structure vs. union, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers

Dynamic memory allocation: Introduction to Dynamic memory allocation, malloc, calloc, realloc.

[**Mode of Evaluation: The performance of students is evaluated as follows:**

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Identify situations where computational methods would be useful.	1,2,3,4,5,6,8,9,12
2	Approach the programming tasks using techniques learnt and write pseudo-code	1-12
3	Choose the right data representation formats based on the requirements of the problem.	1-6, 8-12
4	Use the comparisons and limitations of the various programming constructs and choose the right one for the task.	1-6, 8-12

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20CST111					**Problem Solving with Programming**								

1=addressed to small extent

2= addressed significantly

3=major part of course

20UCT141	Communication Skills	L	T	P	S	C	CH
Version 1.00		2	0	0	0	2	30
Pre-requisites/ Exposure	Studied English Language upto senior secondary						
Co-requisites	-						

COURSE OBJECTIVES

The Course aims to:

1. Augment students overall communication and interpersonal skills by making them realize the importance of good oral and written English Language in professional life.
2. Enrich their reading capability with special emphasis on expanding vocabulary and grammatical formations.
3. Build exceptional reading and writing skills by correcting grammatical errors and pronunciation through practice.

COURSE OUTCOMES

On completion of this course, the students are expected to

1. Produce correct contextual written text and speech in a wide range of communication situations.
2. Write original short compositions, in the form of paragraph writing, business correspondence, blogs etc. through logical support and argument.
3. Demonstrate linguistic competence through accuracy in grammar, pronunciation and vocabulary.

COURSE DESCRIPTION

The course provides a strong foundation in English grammar and equips the students with the fundamentals of the language in LSRW skills. English proficiency is achieved by focusing on socio-linguistic usage. The course introduces basic business communication with special emphasis on effective business correspondence and digital content writing.

TEXT BOOKS

T1 Raman, M. and Sharma, S; Technical Communication - Principles and Practice, Oxford University Press (2018), New Delhi.

REFERENCE BOOKS

R1   Lesikar R.V., Petit J.D., Business Communication, Tata McGraw (2016), New Delhi.

R2   Chaturvedi, P.D. and Chaturvedi, Business Communication, Pearson Education (2017), New Delhi

R3   Murphy, R., Elementary Grammar, Cambridge University Press (2017), UK

R4   Murphy, R., Essential Grammar in Use, 5th Edition Cambridge University Press (2018), UK

R5   Hewing, Martin, English Grammar (Intermediate Level), Cambridge University Press (2017), UK

COURSE CONTENT

Unit I: Business Communication   **10 Contact Hours**

Business Communication: Meaning, importance, process, models and types, barriers to effective communication, verbal and non-verbal communication, Techniques for building LSRW Skills and Case Study
Reading Skills: Reading Comprehension
Writing: Paragraph writing, note making and note taking
Grammar: Parts of Speech, articles, modal verbs
Vocabulary: Word formation - Prefixes, suffixes and compounds, homonyms, homophones, homographs

Unit II: Business Correspondence   **10 Contact Hours**

Ethics in Communication - Significance, Factors, Dilemmas in Ethical Communication, Case Study

Writing: Précis writing, leave application, permission letter, business letters - sales, request, order, inquiry, acknowledgement, complaint and collection letters, memorandum writing, office order, circular, various types of notice writing.
Grammar: Tenses, concord (subject-verb agreement), punctuation
Vocabulary: One-word substitutes, synonyms, antonyms – contextual usage.

Unit III: Digital Content Writing   **10 Contact Hours**

Cross-Cultural Communication – Significance, elements, cultural context and barriers to Cross Cultural Communication, Case Study

Writing: Summarizing, creative writing, email writing, digital content writing (blogs and websites), proofreading

Grammar: Narration, voice, transformation and correction of sentences

Vocabulary: Collocations, idioms

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Produce correct contextual written text and speech in a wide range of communication situations.	10
2	Write original short compositions, in the form of paragraph writing, business correspondence, blogs etc through logical support and argument.	10
3	Demonstrate linguistic competence- through accuracy in grammar, pronunciation and vocabulary.	10

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20UCT141	**Communication Skills**	0	0	0	0	0	0	0	0	0	3	0	0

1=addressed to small extent

2= addressed significantly

3=major part of course

20MEP114 (Odd Sem) 20MEP154 (Even Sem)	COMPUTER GRAPHICS USING CAD	L	T	P	S	C	CH
Version 1.00		0	1	2	0	2	3
Pre-requisites/ Exposure	None						

COURSE OBJECTIVE

1. To introduce the students to engineering drawing, the universal language and tools of communication of engineers.

COURSE OUTCOMES

After completion of the course, the students will be able to

1. Sketch the different conventions and representations of engineering graphics on AutoCAD software. Explain the use of engineering drawing, compare and predict the geometrical details of common engineering objects.
2. Classify, examine and draw the dimensioned figures expressing information about the shape and size of physical objects.
3. Identify and express the geometrical features of a product on AutoCAD software. Draw orthographic views of computer components.

COURSE DESCRIPTION

This course is based on the subject Engineering Drawing employed for 1st year students. In this subject, the students will learn the basics of technical drawing. All the figures are to drawn on AutoCAD software. In this figure, the students will draw the orthographic projections of basic computer components on the software.

TEXT BOOKS

T1   Rhodes R.S, Cook L.B; Basic Engineering Drawing, 1st Edition, Pitman Publishers.

T2   Rana and Shah; Engineering Drawing,2nd Edition, Pearson Education India Publishers,(2009).

T3   Jolhe D.A; Engineering Drawing: With an Introduction to AutoCAD,2nd Edition, Tata McGraw Hill (2007)

REFERENCE BOOKS

R1   Ostrowsky.O; Engineering Drawing with CAD application 2nd Edition, Routledge Publishers 2007.

R2   Aggarwal B; Engineering Drawing, 1st Edition, Tata McGraw Hill Publications,2008.

R3   Gill P.S; Engineering Drawing ,5th Edition, S.K. Kataria and Sons Publications, 2011.

R4   Dhawan R. K; Engineering Drawing, 7thEdition ,S. Chand and Sons Publishers.

R5   Bhatt N.D; Engineering Drawing,50th Edition, Charotar Publication,2011.

COURSE CONTENT

Unit I: **18 Contact Hours**

Fundamentals of Engineering Drawing
Scope and Importance of Engineering Drawing, Conventions for lines, Introduction to general principles of dimensioning, Scales, R.F, full size, reduced and enlarged scales, Introduction to basics of CAD software's like AutoCAD and various draw, modify, dimensioning and layer commands; model and layout view; plotting of sheet.

Projection of points
Introduction to projection, their principals & various types of projection systems; Orthographic Projection; Introduction to planes of projection (reference planes) and auxiliary planes, Orthographic Projection of point in all the four quadrants 2-D drawing of points in AutoCAD software.

Unit II:	15 Contact Hours

Projection of lines
Projection of lines in different quadrants according to its orientation/position with horizontal, vertical plane; true and apparent lengths, Projection of lines parallel to both HP and VP, inclined to one plane and parallel to the other. 2-D drawing of lines in AutoCAD software

Projection of Planes
Projections of plane surfaces-triangle, square, rectangle, pentagon, hexagon and circular planes in different positions when plane is parallel to one of the reference planes, inclined to one of the reference planes and perpendicular to other only. 2-D drawing of planes in AutoCAD software

Unit III:	15 Contact Hours

Isometric Projection
Introduction, isometric scale, isometric projection of simple plane figures, isometric projection of cube, square block, pyramid, cylinder & cones

Orthographic Projection of Computer Components
Orthographic projections of simple solids from the given 3D/isometric view, orthographic projections of computer components such as USB storage device, 4 port switch hdmi 2.0 splitter, wireless router, single cellular mobile router, etc.

Mode of Evaluation: The performance of students is evaluated as follows:

| Components | Practical | |
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	60	40
Total Marks	100	

Instructions For Practical Examination :
* The final examination will be conducted as an external practical in a computer lab on CAD software.

- The question paper will have 7 questions from which, Section-A will have question 1 and it will be compulsory to be attempted by the students. Students will have to attempt total 3 questions from sections B, C and D.
- Sections B, C and D will consist of 2 questions each, out of which attempting at least 1 question from every section will be compulsory.
- Students have to attempt Section- A on answer sheet/sketch sheet and all the remaining questions will be answered on CAD software.
- The print out of the attempted questions on CAD software on A4 size sheet is to be plotted and attached with the answer sheet for final evaluation.

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Sketch the different conventions and representations of engineering graphics on AutoCAD software. Explain the use of engineering drawing, compare and predict the geometrical details of common engineering objects.	1,2
2	Classify, examine and draw the dimensioned figures expressing information about the shape and size of physical objects.	1,2
3	Identify and express the geometrical features of a product on AutoCAD software. Draw orthographic views of computer components.	1,2,3

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20MEP114 (Odd Sem) 20MEP154 (Even Sem)	**Computer Graphics using CAD**	2	2	2	1	3	1	1	1	1	1	2	3

1=addressed to small extent

2= addressed significantly

3=major part of course

20SPP142 (Odd Sem) 20SPP182 (Even Sem)	Quantum & Semiconductor Physics Lab	L	T	P	S	C	CH
Version1.00		0	0	2	0	1	2
Pre-requisites/ Exposure	Physics and Mathematics (10+2 level)						
Co-requisites							

COURSE OBJECTIVES

1   To train engineering students in basis of measurements and the instruments.
2.   To give practical training on basic of Physics experiments which are useful to engineers.
3.   To equip the students with practical knowledge in electronics and optics.

COURSE OUTCOMES

On completion of this course, the students are expected to learn

1.   It will provide the modest experience that allows students to develop and improve their experimental skills and develop ability to analyze data.

2.   Ability to demonstrate the practical skill on measurements and instrumentation techniques of some Physics experiments.   Students will develop the ability to use appropriate physical concepts to obtain quantitative solutions to problems in   physics.

3.   Students will demonstrate basic experimental skills by setting up laboratory equipment safely and efficiently, plan and carry out experimental procedures, and report verbally and in written language the results of the experiment.

COURSE DESCRIPTION

The course deals with the practical training of physics experiments related to optics, electrical and electronics.

TEXTBOOKS

T1.   Sharma Saroj,"Physics Experiments for engineers", EditionIst, (2009), Oscar publications, New Delhi.

T2.   Shukla R. K., and SrivastavaAnchal, "Practical Physics", Edition1st,(2006), New Age International (P) Ltd, New Delhi.

T3.   Arora C.L.," B.Sc. Practical Physics", Revise Edition, (2007), S. Chand & Company Limited.

REFERENCEBOOKS

R1.   Souires G. L., "Practical Physics", Edition 4th,(2001), Cambridge University, UK.

R2.   Chattopadhyay D., Rakshit P. C., and Saha B., "An Advanced Course in Practical Physics", Edition 2nd,1990), Books & Allied   Ltd., Calcutta.

COURSECONTENT

Unit I:	8 Contact Hours

1.   To find the divergence of LASER beam.

2.   To determine the diffraction using LASER beam and find the grating element of diffraction grating.

3. To determine the numerical aperture of optical Fibre.
4. Determine the attenuation and propagation losses in optical Fibre.

Unit II: **8 Contact Hours**

Allocation of project in consultation with faculty
5. To find the resistivity and energy band gap of the semiconductor material using four probe method.
6. To draw the reverse characteristics of Zener diode.
7. To Determine Hall Voltage And Hall Coefficient Using Hall Effect.
.

Unit III: **8 Contact Hours**

8. To study ferroelectric behavior of any material.
9. To find the thermal conductivity of nanofluids.
10. To study magneto resistance of a material.
11. To determine the impedance of AC Circuit.
12. Mini Project – Concept based Demonstration.

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment(CAE)	**Semester End Examination(SEE)**
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes(POs)

S No.	Course Outcome(CO)	Mapped Programme Outcome(PO)
1	It will provide the modest experience that allows students to develop and improve their experimental skills and develop ability to analyze data.	1,2,3,4,5,6,9,11,12
2	Ability to demonstrate the practical skill on measurements and instrumentation techniques of some Physics experiments. Students will develop the ability to use appropriate physical concepts to obtain quantitative solutions to problems in physics.	1,2,3.4,5,6,12
3	Students will demonstrate basic experimental skills by setting up laboratory equipment safely and efficiently, plan and carry out experimental procedures, and report verbally and in written language the results of the experiment	1,2,3,5,7,10,12

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20SPP142 (Odd Sem) 20SPP182 (Even Sem)	**Quantum & Semiconductor Physics Lab**	3	2	2	1	3	1	1	1	1	1	1	2

1=addressed to small extent
2=addressed significantly
3=major part of course

20ELP112(Odd Sem) 20ELP152(Even Sem)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	S	C	CH
Version 1.00		0	0	2	0	1	0
Pre-requisites/ Exposure	Physics (10+2 level)						
Co-requisites							

COURSE OBJECTIVE

The purpose of this course is to :

1.	make students understand Electrical & Electronics Engg. fundamentals.
2.	impart specific knowledge and skills so as to enable students to comprehend how electric,magnetic and electronic circuits are applied in practice.

COURSE OUTCOMES

On completion of this course, the students shall be able to

1.	construct and predict the characteristics of PN junction diode.
2.	implement and use logic operation of gates.
3.	establish relationship between voltage and current in series R-L circuit.
4.	implement staircase and corridor wiring.
5.	assess power of three phase ac circuit.
6.	construct interfacing of A/D and D/A converter

COURSE DESCRIPTION

The course starts with an insight to DC & AC circuits. Students are then introduced to transducers & DC motors from the perspective of use in real world with Open source embedded platforms. The course further emphasizes upon the design and analysis of op-amp based circuits.

COURSE CONTENT

Note: Along with the prescribed practical syllabus, every student is required to pursue one Project during the semester. The project report will be submitted & final presentation will be made. The evaluation of the Project will be done as one of the experiments.

List of Experiments

	UNIT-I	(8 Hrs)

1.   To study the characteristics of a P-N junction diode and design rectifier.
2.   To verify logical expressions using logic gates.
3.   To study voltage-current relationship in an R-L series circuit and to determine the power factor of the circuit.

➢   **Project finalization in consultation with the faculty member.**

	UNIT-II	(8 Hrs)

4.   To measure the power of 3 phase AC Circuits using wattmeter method.
5.   To verify and demonstrate the working of LVDT.
6.   To implement stair case and corridor wiring.

➢   **Completion of experimentation/fabrication of project finalized.**

	UNIT-III	(8 Hrs)

7.   To interface Analog-to-Digital (ADC) converter with Op-Amp.
8.   To interface Digital to Analog (DAC) convertor with Op-Amp.
9.   Study frequency response of an RC coupled amplifier.

10.	To control speed of DC motor with analog input and a transistor.

➤	**Final Presentation of viva voce examination of the Project.**

Mode of Evaluation: The performance of students is evaluated as follows:

	LAB	
Components	Continuous Internal Assessment (CIA)	Semester End Examination (SEE)
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between Cos and Pos		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	construct and predict the characteristics of PN junction diode.	1,2,3
2	implement and use logic operation of gates.	1,2
3	establish relationship between voltage and current in series R-L circuit.	1,2,3
4	implement staircase and corridor wiring.	1,2,3
5	assess power of three phase ac circuit.	1,2,3,4

| | | 6 | construct interfacing of A/D and D/A converter | | | | | | | | | | 1,2,3,4 | | |

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20ELP112 **20ELP152**	**Basic Electrical And Electronics Engineering Lab**	3	3	2	1	1	1	1	1	2	2	1	2

1=addressed to small extent

2= addressed significantly

3=major part of course

Teaching –Learning Process

Teaching aids		Open-ended problem/ Numerical	Project-type activity	Lab Work	Open-ended lab work	Delivery mode		Beyond the curriculum	
Video, ppt. etc	Online lecture					Theory/ Description	Numerical/ Designed problem		
√		√	√	√		60%	30%	10%	

Paper setting instructions
Instructions for the Paper-Setter

Please go through these instructions thoroughly and follow the same pattern while setting the paper as the students have been prepared according to this format.

Maximum Marks = 60   Time: 3 Hrs
Weightage per unit = 20 marks (excluding over attempt weightage)
1. Question Paper will consist of ten questions.
2. Section A of question paper is compulsory, containing five parts each of 2 marks covering the whole syllabus (short answer type- total 10 marks)
3. Set three questions from each unit I, II and III. Students will attempt 5 questions selecting at least one question from sections B, C & D. Each question carries 10 marks. Questions of Section B will be from unit I, Questions of Section C from unit II and Questions of section D from unit III.
4. In the question paper, distribution of the questions should be by considering 30 % numerical part and 70 % conceptual.

20CSP112	Problem Solving with Programming Lab	L	T	P	S	C	CH
Version 1.00		0	0	4	0	2	
Pre-requisites/ Exposure	Basic mathematics and computation						
Co-requisites							

COURSE OBJECTIVES
1. The course aims to provide exposure to problem-solving through programming.
2. The course aims to raise the programming skills of students via logic building capability.
3. With knowledge of C programming language, students would be able to model real world problems.

COURSE OUTCOMES
On completion of this course, the students are expected to

1. Identify situations where computational methods would be useful.
2. Approach the programming tasks using techniques learnt and write pseudo-code
3. Choose the right data representation formats based on the requirements of the problem.
4. Use the comparisons and limitations of the various programming constructs and choose the right one for the task.

COURSE DESCRIPTION
The course begins with the introduction to Basic concepts of programming and its applications in numerous fields. After covering fundamentals, students will learn how to apply the more complex concepts including loops and arrays in order to solve the complex real world problems.

TEXT BOOKS
- **T1** Programming in ANSI C by E. Balaguruswamy, Tata McGraw Hill.
- **T2** Programming in C Ansi standard, by Yashwant Kanetkar, BPB Publications.

REFERENCE BOOKS

R1   Programming with C (Schaum's Outline Series) by Byron Gottfried Jitender Chhabra, Tata McGraw Hill.
R2   C Programming Language by Brian W. Kernighan, Dennis Ritchie, Pearson education.
R3   C How to program by Harvey Deital, 8th edition

COURSE CONTENT

Unit I: Introduction to basic building blocks to programming   10 Contact Hours

Practical 1.1: Write a program to input following details of a under-graduate student
  i   Name (string)
  ii   Age (integer)
  iii   Contact number (long long integer)
  iv   Percentage in metric class (float / double)
Your program should generate output as follows:
**************STUDENT DATABASE******************
Enter name in capital letters: xyzpqr
Enter age   : 18
Enter contact number   : 9876543210
Enter percentage in metric : 86.84
Thank you. Your data has been saved in our system
****

Practical 1.2: A cube having a side of 6 cm is painted red on all the faces and then cut into smaller cubes of 1 cm each. Write a program to find the total number of smaller cubes so obtained.

Practical 1.3: A train can travel 50% faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. Write a C program to compute the speed of car.

Practical 1.4: Sonu ranked m^{th} from the top and n^{th} from the bottom in a class. How many students are there in the class?

Practical 1.5: A can do a piece of work in 8 days. B can do the same work in 14 days. Write a program to calculate and print the number of days to be taken to complete the work if A and B work together.

Practical 2.1: Ram , Mohan and Sohan took loan of Rs. x, y and z on rate of interest r %,p %,q % for time t1,t2 and t3 years respectively . Calculate simple interest they will pay and findwho will pay the most using ternary operator ?

Practical 2.2: Inside the CPU, mathematical operations like addition, subtraction, multiplication and division are done in bit-level. To perform bit-level operations in C programming, bitwise operators are used. Apply the knowledge you gained while learning bitwise operators.

Write a program to input two integers from user by using single scanf. Compute and display the value for a& b, a| b, a ⊕b.

Practical 2.3: Write a C program to find out year in which Mr. kavi was born from the following information :
a)   Kavi is m years younger than his mother.
b)   Kavi's brother who born in year y(1900<=y<=2019) is n years younger to his mother
c)   If kavi's brother is reading in class r then On the basis of your common sense also predict
     In which class Kavi is reading?

Practical 2.4:If last day of mth month of the year is Friday then find out nth day(1<=n<=31) of the same month .

Practical 2.5: In a class of N students where girls and boys ratio is p:q Savita ranked rth from the top. If there are m (m<r) boys ahead of Savita, how many girls are after her rank ?Also find whether she is among top 10 students of the class or not ?

Practical 3.1: In a class of n students the boys to girls ratio is p:q. Find no. boys and girls in the class and print :
1)   If boys are more than or equal to 70% in the class then print gender partiality in education
2)   If difference of boys are girls is diff and in range -5<=diff<=5 then print equal opportunities of education for both
3)   If girls are more than equal to 70% then print girls dominating in education.
4)   For all others cases print no conclusion drawn

Practical 3.2: Write a menu driven program that allow the user to perform any one of the following operations based on the input given by user
    i   Check number is even or odd
    ii   Check number is positive or negative
    iii Printing square of the number
    iv Printing square root of the number (use math.h)

Use switch statement for a menu driven program. Also, use validation checks wherever necessary.

Practical 3.3: Amba Aambika and Ambalikahave money in the ratio x:y:z. All go to market and spend money in ratio p:q:r .total money they have initially is Rs. N .After spending money in the market who has maximum amount left with ?

Practical 3.4:While travelling in a train, you observe some college students pulling the alarm chain simply to get down at their desired point.Out of n students m<=n times students pull the chain .You have to print according to the following:
1) If m is >=80 % of n then print strict action is required to restrict this event
2) If m is between 50 to 80 % then print guidelines should be issued
3) If between 10 to 50% then print request to restrict the event
4) If less than 10% then print No action required

Unit II: Dealing with real-world problems   **10 Contact Hours**

Practical 4.1: A salesman has n things to sale .The cost price of all n things is different out of which p things he is selling on m% profit and n-p things he is going to sell on x% loss . Find his net profit or loss

Practical 4.2: Find m greatest 6-digit and n smallest 7-digit numbers which are divisible by number p. Print these numbers on the screen.

Practical 4.3: There are n customer of bank who took loan of different amounts(Entered by User) and for different time periods but same rate of interest. The interest is compounded annually find the total interest earned by bank from all n customers.

Practical 4.4:On reaching the railway station, you find that the train you wanted to catch is just to start and there is hardly any time for purchasing the ticket. The same situation faced by many people in our country. You have to do data analysis task for which you will record responses from N people and then print your report accordingly.User enter option a for "Rush to train to catch it and inform T.T at next stop, b for" Catch the train and perform journey without ticket", c for "purchase the ticket first otherwise wait for next train", and d for "Miss the train and take ticket for next train ".On the basis of responses print in your report about the habit of our countrymen. If responses of any two options are equal then print it in either or form. If more than two responses are equal or having difference <=1 then print no conclusion drawn.

Practical 4.5:You are given task to write numbers from m to n, during this task how many times do you write digit d. e.g. if m=10 and n=25 and d=1you write from 10 to 20 on screenand count how many times you write 1. In this case count for d=1 is 11 as from 10 to 19 you write 1,10 times and once in 21 so total count is 11?

Practical 5.1: There are n persons each have 25 paise coins , 50 paise coins and Rs1 coins in the ratio p:q:r but have different

amounts stored in a single list . Find and print no. of 25 paise coins, 50 paise coins and 1 Rs coins each person have.

Practical 5.2: Write a program to perform various matrix operations Addition, Subtraction, Multiplication, Transpose using switch-case statement

Practical 5.3: In a list there is cost price of n goods. On the most expensive thing there is a loss of x% and on the cheapest thing there is a gain of y% and on rest of things there is a gain of p%. Find loss or gain on whole transaction in Rupees.

Practical 5.4: Suppose you have a device which when fed with the input numbers, rearranges them in a particular order using some rules. The following is a step-by-step process of rearrangement for the given input of numbers.

Input   :- 1   2 3 4 9 10 8 6
Step I   :- 4 1 2 3 9 10 8 6
Step II :- 9 4 1 2 3 10 8 6
Step III :- 10 9 4 1 2 3 8 6
Step IV :- 8 10 9 4 1 2 3 6
Step V:- 6 8 10 9 4 1 2 3

In first step you select 5th last element and places it as first and append rest of the list,in second step you select 4th last element and place it as first element and append the remaining list and so on. Take the input and print output as specified by 5^{th}step

Practical 5.5: N students of your class ride their vehicles to reach University,the distances from their homes   and time taken to reach are recorded .University issued the guidelines mentioned speed limit of m Kmph for safe driving. On the basis of your class data you have to print whether your class is following university guidelines or not.

Practical 6.1: Sonali joined a social networking site to stay in touch with her friends. The signup page required her to input a name and a password. However, the password must be strong. The website considers a password to be strong if it satisfies the following criteria:

Its length is at least 6.

It contains at least one digit.

It contains at least one lowercase English character.

It contains at least one uppercase English character.

It contains at least one special character. The special characters are: !@#$%^&*()-+

She typed a random string of length n in the password field but wasn't sure if it was strong. Given the string she typed, can you find the minimum number of characters she must add to make her password strong?

Practical 6.2: A string of length N contains (N*(N+1))/ 2 substrings. Write a program to input string and print its multiple

substrings.

Example: String "abc" will have {a, b, c, ab, bc, abc} set of substrings.

Practical 6.3: You store name of your friends in string array. You are given task to print name of your friend whose name start with particular character and after you find first name in the list you have stop searching and print name you search the list .

Practical 7.1: A function is provided with zero or more arguments, and it executes the statements on it. Based on the return type, it either returns nothing (void) or something. Develop a program to find greatest of four numbers using function int max_of_four(int a, int b, int c, int d) which reads four arguments and returns the greatest of them.

Practical 7.2: Write a recursive function for computing factorial of a number. Write main to test its functioning.

Practical 7.3: Write a program to create functions for following

    i   Input details of employee using input_data() (name, employee id, number of working days, date of joining, initial salary, contact number, designation, department)

    ii   Calculate monthly salary using calc_salary()

    iii Display the monthly salary with deductions if any using display()

Practical 7.4: Store age of all students of your class in an array. Pass this array as an argument and find average height of the class and return it to calling function.

.

Unit III: Handling heterogeneous data and memory management   10 Contact Hours

Practical 8.1: WAP to read an array of elements and print the same in the reverse order along with their addresses using pointer.

Practical 8.2: Write a function code that is returning pointer to the larger value out of two passed values.

Practical 8.3: The bank balance of N persons of a city are recorded. Due to COVID-19 government has decided to credit accounts with Rs. 1000 of all those persons whose balance is nill , Write a function Update_balace() by passing pointer to an array as argument and print the updated bank balance list in calling function.

Practical 8.4: The CGPA of 5 semesters of N students has stored in NX5 array and names of corresponding students are stored in separate string array The student who got average CGPA >=8 is eligible for placements .Pass pointers to both array to function not_eligible() and print list of non eligible students

Practical 9.1: Create a structure hospital and include the following data members:

    i   Name of patient

ii   Patient id (as static)

iii   Blood group

iv   Contact number (long long)

v   Name of disease

vi   Date of admission

Including the functions to input and print the data for N number of patients.

Practical 9.2: What will the difference if above program is going to be implemented through union. Implement the same program through union and differentiate the output as well as memory allocation.

Practical 9.3:You are given task to store records of mothers and fathers of all students of your class in two separate structures mother and father. Each record will contain name, age, work_status, and height.On the basis of these records you have to print the following.

1) How many mothers are working? If more than 70 % of women are working then print women are job oriented.

2) If difference in heights of mother and father is >=10 inches you have to print like Rama Mismatches Sham where Rama and Sham are names of mother and father

3) You also have to find average difference in the ages of mother and father.

Practical 9.4: Store N student records including fields name, First MST marks .Second MST marks ,lecture attended ,Lecture delivered , If student got average marks of two MST >=80 ,He/She will be eligible for taking exams without taking care of attendance otherwise attendance should be >=75%.Print name of all those students who are detained from final exams .

Practical 10.1: WAP to store a character string in block of memory space created by malloc and then modify the same to store a large string.

Practical 10.2: At the start of your class lecture , n students were present .You declare array dynamically to store roll numbers of these students after 5 Mins m more students join the class now you will reallocate memory space to store n+m roll numbers .Write a program by using functions malloc(), realloc()and free() .

Practical 10.3:Sort the list of N elements where memory is allocated dynamically using pointers

Practical 10.4: Marks of group A having m students and group B having n students   have stored in two dynamically allocated arrays. Find the average aggregate marks of the whole class.

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

SN	Mapping Between COs and Pos	
	Course Outcome (CO)	Mapped Program Outcome (PO)
1	Identify situations where computational methods would be useful.	1,2,3,4,5,6,8,9,12
2	Approach the programming tasks using techniques learnt and write pseudo-code	1-12
3	Choose the right data representation formats based on the requirements of the problem.	1-6, 8-12
4	Use the comparisons and limitations of the various programming constructs and choose the right one for the task.	1-6, 8-12

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20CSP112	**Problem Solving with Programming Lab**												

1=addressed to small extent

2= addressed significantly

3=major part of course

20UCP142	Communication Skills Lab	L	T	P	S	C	CH
Version 1.00		0	0	2	0	1	30
Pre-requisites/ Exposure	Studied English Language upto senior secondary						
Co-requisites	-						

COURSE OBJECTIVES

The Course aims to:

4. Equip students with listening, reading and speaking skills important in academic, professional and cultural situations.

5. Foster self awareness, confidence and a positive attitude in students' ability to communicate effectively in English.

6. Monitor, remediate and strengthen comprehensible pronunciation, intonation and accent.

7. Enhance soft skills of students for preparation to the corporate world.

COURSE OUTCOMES

On completion of this course, the students are expected to

1. Display confidence in listening and speaking skills necessary for interaction in academic, professional and cultural situations

2. Exhibit language effectively for group discussions and public speaking.

3. Use non-verbal skills and soft skills effectively in the social and professional environment.

4. Use correct intonation, stress, pronunciation and neutral accent to communicate in English.

COURSE DESCRIPTION

The course focuses on the enhancement of listening comprehension and speaking fluency in everyday situations by focusing on some essential grammar, vocabulary, and pronunciation. It will help students to cultivate soft skills like time management, stress management and enhance self awareness through SWOC analysis shaping them to become better team players.

TEXT BOOKS

T1 Globarena EL- Client Software for Communication Skills, Hyderabad

REFERENCE BOOKS

R1 Sethi, J., Dhamija, P.V., A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.

R2 Roach P., English Phonetics and Phonology: A Practical Course (English),Cambridge University Press, 4th Edition, UK

R3 O'Connor, J. D. Better English Pronunciation, 2nd Edition, Cambridge University Press, (2012), UK

R4 Hornby, A.S. Oxford Advanced Learners Dictionary of Current English, 7th Edition, Oxford University Press, UK.

COURSE CONTENT

Unit I: 10 Contact Hours

Soft Skills: Self Awareness- Personal attributes, SWOC Analysis
Verbal Skills: Art of Public Speaking- just a minute, extempore, news discussion
Non-Verbal Skills: Positive body language, posture, gestures, symbols and signs
Reading Skills: Reading Comprehension -1 & 2, vocabulary building -1 & 2
Listening Skills: Listening exercises for word stress and pronunciation -1 & 2
Phonetics: Classification of Speech Sounds, Vowel sounds, Introduction to phonetic symbols

Unit II: **10 Contact Hours**

Soft Skills: Goal Setting, Time Management
Verbal Skills: Art of self introduction, extempore, cross talk, news discussion
Reading Skills: Reading Comprehension -3 & 4, vocabulary building- 3 & 4
Non-Verbal Skills: Personal appearance and grooming
Phonetics: Vowel Sounds, Consonant Sounds.

Unit III: **10 Contact Hours**

Soft Skills: Stress Management, Team Building
Verbal Skills: Greetings, Complementing and Inviting, Making Requests
Reading Skills: Reading Comprehension -5 & 6, vocabulary building-5 & 6
Speaking Skills: Group discussion
Phonetics: Diphthongs Sounds, Stress & Intonation rules and practice
Mode of Evaluation: The performance of students is evaluated as follows:

Components	Practical	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	**Course Outcome (CO)**	**Mapped Programme Outcome (PO)**

1	Display confidence in listening and speaking skills necessary for interaction in academic, professional and cultural situations	10
2	Exhibit language effectively for group discussions and public speaking.	10
3	Use non-verbal skills and effective soft skills for the professional and social environment.	10
4	Use correct intonation, stress, pronunciation and neutral accent to communicate in English.	10

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20UCP142	**Communication Skills Lab**	0	0	0	0	0	0	0	0	0	3	0	0

1=addressed to small extent

2= addressed significantly

3=major part of course

20ECP114	Foundation of Internet of Things Lab	L	T	P	S	C	CH
Version 1.0		0	0	2	0	1	2
Pre-Requisites/ Exposure		None					
Co-requisites		None					

COURSE OBJECTIVE

The course will expose students to learn to specify, design and program modern IoT based platforms to capture real-world data and control end devices.

COURSE OUTCOMES

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

1. Establish an interface between embedded IoT system and the physical world through sensors, to read the state of the world, and actuators, to change the state of the world.

2. Establish connectivity of IoT modules with cloud for sensor data collection and management.

3. Design an appcessory with Bluetooth/Wi-Fi connectivity using standard mobile application development tools.

COURSE CONTENT

Introduction Session

▪ Hands-on session on Breadboard, Digital Multimeter, and Simulation Software.

▪ Introduction to IoT Platform SoC built around 32-bit Microprocessor, to be utilized as the core of all below-mentioned tasks/ projects.

▪ Introduction to an open-source app development platform for open-ended Linux based OS primarily for touchscreen based smart devices.

List of Tasks/ Micro-Projects
▪ Introduction to open-source IoT Platform and basic interfacing Hands-on.

▪ Design a Cloud based weather monitoring system using IoT platform and relevant sensors.

▪ Design an air quality monitoring system using an IoT analytics platform service.

▪ Develop a smart phone application for smart home voice-assistant.

▪ Develop a smart phone application for close range wireless robot motion control.

▪ Design an IoT based real-time video surveillance system.

▪ Design a wireless network signal strength logging system for IoT devices.

▪ Develop an IoT based intruder detection and alert system.

▪ Develop a human vitals monitoring and alert system using IoT analytics platform.

▪ Develop an engineered solution to socially relevant problem(s) with technical report.

Mode of Evaluation: The performance of students is evaluated as follows:

Theory		
Components	Continuous Internal Assessment (CIA)	Semester End Examination (SEE)
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (Cos) and Program Outcomes (POs)

Mapping Between COs and POs		
S. No.	Course Outcome (CO)	Mapped Program Outcome (PO)
1.	Establish an interface between embedded IoT system and the physical world through sensors, to read the state of the world, and actuators, to change the state of the world.	2, 3, 4, 5, 8, 9, 12
2.	Establish connectivity of IoT modules with cloud for sensor data collection and management.	1, 5
3.	Design an appcessory with Bluetooth/Wi-Fi connectivity using standard mobile application development tools.	1, 4, 5

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20ECP114	**Foundations of Internet of Things Lab**	1	1	1	1	1	1	1	1	1	3	1	1

COURSE OBJECTIVE

1. To enhance one's ability to be fully self aware by helping oneself to overcome all fears and in securities and to grow fully from inside out and outside in.
2. To increase one's knowledge and awareness of emotional competency and emotional intelligence at place of study/work

COURSE OUTCOMES

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

1. Gain Self Competency and Confidence
2. Practice Emotional Competency
3. Gain Intellectual Competency
4. Gain an edge through Professional Competency

COURSE DESCRIPTION

To develop interpersonal skills and adopt good leadership behavior for empowerment ofself and others.

20UCY146	Life Skills and Mentoring-1	L	T	P	S	C	CH
		0	1	0	0	0	1.0
Pre-requisites/ Exposure	NA						
Co-requisites							

Text Books:

1. Mentoring Programme Handbook, Chandigarh University, 2019

Reference Books:

1. Goals! How to get everything you want –Faster than you ever thought possible. By Brian Tracy
2. Daniel Goleman (2012). Working with Emotional Intelligence. Bloomsbury Publishing India Private Limited

Web Resources:

1. http://www.skillsyouneed.com/ips/improving-communication.

2. https://www.mindtools.com/

3. www.psychologytoday.com

COURSE CONTENT

UNIT-I   **4 Contact Hours**

1. **Self Awareness:** Definition of self awareness, Recognizing one's own attitude, feelings, motives, strengths, The areas of self awareness, How to develop self awareness

2. **Goal Setting:** Effective Planning, Differentiating short term and long term goals, enhancing perseverance

3. **Self Esteem:** Definition of self esteem, Assessing one's own worth, How to develop self esteem

UNIT-II   **4 Contact Hours**

4. **Self Confidence**: Understanding self confidence, benefits self-confidence, characteristics of self-confidence, how to build self- confidence
5. **Stress management:** Understanding stress and stressors, its effect on brain, how to cope with it
6. **Say no to Drugs:** Types of drugs, causes of addiction, sign of troubles, behavioral signs of drug abuse, Prevention
7. **Interpersonal Relationships:** Understanding Relationships, What are examples of good   interpersonal skills, Good interpersonal skills, How Do You Show Good Interpersonal Skills

UNIT-III   **4 Contact Hours**

8.   **Values and ethics:** Understanding values, classification of values, importance of values, Core values

9.   **Empathy:** Understanding empathy, how to develop empathy, assessing your empathy

10.   **Harmony in the relations:** Family is a natural laboratory, Values in human to human relationships, Respect is right evaluation

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	NA	NA
Total Marks	NA	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and Pos		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Understand the concept and nature of Self Awareness, Developing and assessing the Self Awareness, Developing planning and organizational skills, Developing and assessing the Self Esteem	1, 2,3,4
2	Understanding ways to build self confidence and develop Introspection ability, Understanding stressors, and Active coping, Awareness on Drug abuse and Prevention, Understanding of interpersonal skills to manage relationships	1, 2,3,4
3	Clarifying the concept of value-education, Inculcate good manners and responsible behavior, Enhances tolerance, Promotes sense of respect for others feelings, Role of a student towards family, Society and their educational institute	1, 2, 3,4

			1	2	3	4	5	6	7	8	9	10	11	12
20UCY146	**Life Skills and Mentoring-1**													

1. 1=addressed to small extent
2. 2= addressed significantly
3. 3=major part of course

20SMT122 (Odd Sem) **20SMT175(Even Sem)**	**CALCULUS & VECTOR SPACES**	L	T	P	S	C	CH
Version 1.00		3	2	0	0	5	45
Pre-requisites/ Exposure	Knowledge of mathematics up to senior secondary level						
Co-requisites	-						

COURSE OBJECTIVES

The Course aims to:

1.   Familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra.

2.   Equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards solving more advanced level of mathematics and applications that they would find useful in their respective disciplines**.**

COURSE OUTCOMES

On completion of this course, the students are expected to

1. Understand and apply the concept of partial derivatives to solve mathematical problems and understand its application in real life situations.
2. Analyze the concept of Group theory and its application of analysis to Engineering problems.
3. Demonstrate the concept of vector spaces in a comprehensive manner.

COURSEDESCRIPTION

The course provides a strong foundation in Calculus and Vector Spaces and equips the students with the fundamentals of mathematical tools for solving basic mathematics problems.Thisis achieved by focusing on concept understanding and appropriate application of that. The course introducesbasiccalculus topics and introduces the students to vector spaces with discussion of their applications in various engineering fields.

TEXT BOOKS

T1	E. Kreyszig, Advanced Engineering Mathematics, John Wiley,10th Ed.2011., New Delhi
T2	H.K. Dass., Higher Engineering Mathematics, S Chand Publishers, 3rd revised edition, 2014.
T3	B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 42th ed.2013, New Delhi.

REFERENCE BOOKS

R1	R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, 3rd Edition, Narosa Publishing House, 2004, New Delhi.
R2	B.V. Ramana Advanced Engineering Mathematics, McGraw Hill, July 2006, New Delhi.
R3	B. Thomas andR.L. Finney, Calculus and Analytic Geometry, Pearson Education, 11th Edition.
R4	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

COURSE CONTENT

Unit I: Calculus   **15 Contact Hours**

Partial Differentiation, Euler's Theorem, Composite functions, Jacobian.Taylor's and Maclaurin's Series for one and two variables. Multiple Integrals, change of order and Change of Variable. Area and volume using double and triple integrals.

Unit II: Calculus and Algebraic Structures   **15 Contact Hours**

Calculus: Indeterminate forms and L Hospital's rule
Algebraic structures: Definition, elementary properties of algebraic structures, semigroup monoid, group, homomorphism, isomorphism and automorphism, congruence relations, subgroups, normal subgroups, cosets, Lagrange's theorem, cyclic groups.

Unit III: Vector Spaces   **15 Contact Hours**

Vector Space, linear dependence of vectors, Basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank- nullity theorem (Without Proof) , composition of linear maps, Matrix associated with a linear map. Inner product spaces, Gram-Schmidt orthogonalization

MODE OF EVALUATION: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Understand and apply the concept of partial derivatives to solve mathematical problems and understand its application in real life situations.	1 to 5, 12
2	Analyze the concept of Group theory and its application of analysis to Engineering problems.	1 to 5, 12
3	Demonstrate the concept of vector spaces in a comprehensive manner.	1 to 5, 12

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20SMT122 (Odd Sem) 20SMT175 (Even Sem)	**CALCULUS & VECTOR SPACES**	3	2	3	2	1	0	0	0	0	0	0	1

1=addressed to small extent

2= addressed significantly

3=major part of course

20SZT148(ODD) 20SZT188(EVEN)	Biology For Engineers	L	T	P	S	C	CH
Version 1.00		3	0	0	0	3	
Pre-requisites/ Exposure	NIL						
Co-requisites							

COURSE OBJECTIVES

1. This subject is designed to impart fundamental knowledge on emerging fields of sciences like bioinformatics.

2. It is designed to impart knowledge that how to apply different softwares in research.

COURSE OUTCOMES

On completion of this course, the students are expected

1. To apply knowledge of cell biology to identify, formulate, and solve problems.

2. To excel in career as researcher in both traditional and emerging fields of science .

3. To apply knowledge of molecular biology, biosensors and immunology to excel in areas such as entrepreneurship, medicine, government, and education.

4. To think critically and creatively, especially about the use knowledge about biology of cancer and new areas of biology to address local and global problems.

COURSE DESCRIPTION

The course begins with the theoretical study of cell biology which is widely utilized in medical sciences .The students are then introduced to medical instrumentation. The course further emphasizes on the use of softwares, as well as disease

TEXT BOOKS

T1.   C.B.Powar, 2010.Cell Biology.5thEd,Himalyan Publishing House.

T1.   C.B.Powar, 2010.Cell Biology.5thEd,Himalyan Publishing House.

T2.   Leshie Cromwell, Fred.J. Weibell and Erich.A.Pfeiffer. 2003. Biomedical instrumentation and measurements. 2nd edition, PHI.

T3.   John G. Webster 1998. Medical Instrumentation: Applications and Design, 3rd edition, Jon Wiley and Sons, New York.

T4.   Fundamental concepts of bioinformatics. Dan E. Krane, Michael L. Raymer

T5.   Bioinformatics Methods and applications. S.C Rastogi P Rastogi

REFERENCE BOOKS

R1.   Jeremy M. Berg, John L. Tymoczko and LubertStryer. 2006. "Biochemistry," 6th Ed. W.H. Freeman and Co. Ltd.

R2.   Robert Weaver. 2012 "Molecular Biology," 5th Edition, MCGraw-Hill.

R3.   Jon Cooper, **, 2**004. "Biosensors A Practical Approach" Bellwether Books.

R4.   Martin Alexander, 1994 "Biodegradation and Bioremediation," Academic Press.

R5.   Kenneth Murphy, 2011. "Janeway's Immunobiology," 8th edition, Garland Science.

R6.   Eric R. Kandel, James H. Schwartz, Thomas M. J. 2012. "Principles of Neural Science, 5th Edition, McGraw-Hill.

R7.   S. ThyagaRajan, N. Selvamurugan, M. P. Rajesh, R. A. Nazeer, Richard W. Thilagaraj, S. Barathi, and M. K. Jaganathan. 2012 "Biology for Engineers," Tata McGraw-Hill, New Delhi.

CU Institute of Engineering

COURSE CONTENT

Unit I: Basic Cell Biology   15 Contact Hours

Introduction: Living Organisms, Cells and Cell theory, Cell Structure and Function, Genetic information,
protein synthesis, and protein structure, Cell growth, Cell Division, and differentiation. aging, apoptosis, stem
cell Biology and Tissue engineering

Unit II: Uses of Biology in Engineering   15 Contact Hours

Medical Instrumentation and Techniques- Electrocardiogram (ECG), Electroencephalogram (EEG), Electro Myogram (EMG),
Magnetic Resonance Imaging- principles of MRI,X-ray.

Biosensors -Chemoreceptors, hot and cold receptors, baro receptors, sensors for smell, sound, vision, osmolality and taste.
Transducers.

Recombinant DNA Technology- Vectors, Types of Vectors, BAC, YAC, DNA Fingerprinting ,PCR Electrophoresis Blotting Technique, Chromatography.

Immunology-Innate, Adaptive, Lymphiod Organs, types of cell

Unit III: Uses of Softwares   15 Contact Hours

Enzymes and Industrial Application- Enzymes:Biologicalcatalysts,Proteases,Carbonicanhydrase,Restriction enzymes and Nucleoside monophosphate kinases-Photosynthesis

Nervous System- Neuron ,structure, PNS,CNS,Action potential

Bioinformatics-Introductory Bioinformatics, BLAST, FASTA, Data mining

Disease – HIV, CoronaVirus, Diabetes, Cancer

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
	Mapping Between COs and POs	
1	The student will be able to apply knowledge of cell biology to identify, formulate, and solve problems.	1,2
2	To excel in career as researcher in both traditional and emerging fields of science	1,2,3
3	The student will be able to apply knowledge of molecular biology, biosensors and immunology to excel in areas such as entrepreneurship, medicine, government, and education.	1,2,3
4	The student will be able to think critically and creatively, especially about the use knowledge about biology of cancer and new areas of biology to address local and global problems.	1,2,3

		Engineering Knowledge	Problem analysis	Design/development of	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20SZT148(ODD) 20SZT188(EVEN)	Biology For Engineers	3	0	0	0	0	0	0	0	0	0	0	0

1=addressed to small extent

2= addressed significantly

3=major part of course

20ECT115 (Odd Sem) 20ECT155 (Even Sem)	Digital Electronics	L	T	P	S	C	CH
Version1.00		3	0	0	0	3	3
Pre-requisites/ Exposure	NIL						
Co-requisites							

COURSE OBJECTIVES

1. To understand Merits of digitization.
2. To enable you to understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To Impart Knowledge about various digital circuits and designing of systems

COURSE OUTCOMES

On completion of this course, the students are expected to learn
1. Merits of digital systems, various number systems and their applications.
2. Combinational and Sequential Digital Designing and solution to basic digital problems.
3. Designing of sequential circuits and introduction to memory logic design

COURSE DESCRIPTION

The Course begins with the basis concepts of Digital and analog Systems along with the basis application to day to day life. The students are trained how to implement these basis concept of conversions and combinational and sequential circuits to daily needs application and designing of circuits.

TEXTBOOKS

T1:   Mano,Morris, Digital Design, Prentice Hall of India.

T2:   Malvino, Digital principle and applications, Tata Mc Graw Hill .

T3:   Floyd & Jain, Digital Fundamentals, Pearson.

REFERENCE BOOKS

R1:   Fletcher, AnEngg. Approach to digital design,Prentice Hall of India.

R2:   C.H. Roth , Fundamentals of logic Design , CL Engg.

R3:   Subrata Ghoshal, Digital Electronics , Cengage.

COURSE CONTENT

Unit I: **15 Contact Hours**

Basics: Introduction to digital electronics ,Need of digital , Merits and Demerits, Difference between Analog and Digital Electronics.   [2 hr]

Number System: Introduction, Binary, Octal and Hexadecimal number system. Signed and unsigned number; Binary operations: Addition, Subtraction, Multiplication and division; Subtractions using 1's and 2's compliment, BCD code and gray code.   [7 hrs]

Logic gates and Minimization: Introduction to basic gates : OR, AND, NOT, NOR, NAND, EX-OR, Basic theorem of Boolean Algebra, sum of products and product of sums, canonical form, Simplifications using K-map (4 variable)   [6hrs]

Unit II: **15 Contact Hours**

Combinational Circuits: Introduction to Combinational circuit design, half adder, full adder, BCD Adder, Half Subtractor, Full Subtractor, Multiplexer, Demultiplexer, encoder, decoder and magnitude comparator.   [7 hrs]
Sequential Circuits :Introduction to sequential circuits, latch & flip flop (SR, JK, D and T), race around condition, conversion of various flip flops. [8hrs]

Unit III: **15Contact Hours**

Designing of Sequential Circuits:
Basic introduction to Counters: synchronous and asynchronous counters and designing. [9 hrs]
Basic introduction to Counters: synchronous and asynchronous counters and designing.
Shift Registers: Types ,Circuit Diagram, Timming waveforms.   [4 hrs]
Semiconductor Memories :Introduction, Classification: RAM, ROM, PROM, EPROM, EEPROM.

   Mode of Evaluation: The performance of students is evaluated as follows :

Components	Theory	
	Continuous Internal Assessment(CAE)	Semester End Examination(SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes(COs) and Program Outcomes(POs)

	Mapping Between COs and POs	
SN	**Course Outcome(CO)**	**Mapped Programme Outcome(PO)**
1	Merits of digital systems, various number systems and their applications.	1,2
2	Combinational and Sequential Digital Designing and solution to basic digital problems.	1,2
3	Designing of sequential circuits and introduction to memory logic design	1,2,3

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20ECT155	**Digital Electronics**	3	2	2	2	1	1	1	1	1	1	1	2

Course	PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
Digital Electronics — 20ECT115 (Odd Sem) 20ECT155 (Even Sem)	CO1	1	1	0	2	0	0	0	2	0	0	0
	CO2	3	2	0	3	2	1	2	2	1	1	0
	CO3	3	3	3	3	2	1	1	3	2	3	0

1=addressed to small extent
2=addressed significantly
3=major part of course

20PCT154	Professional Communication Skills	L	T	P	S	C	CH
Version 1.00		2	0	0	0	2	30
Pre-requisites/ Exposure	Studied Communication Skills Course						
Co-requisites	**20PCP158**						

COURSE OBJECTIVES

The Course aims to:

1. Stress on students awareness of interpersonal communication skills and appropriate usage of verbal and non-verbal expression in social and professional environment.

2. Prepare the student for discourse in English, using a number of communication strategies.

3. Introduce them to key concepts of Morality, Diversity & Inclusion

4. Provide foundations for the placement process of the student.

COURSE OUTCOMES

On completion of this course, the students are expected to

1. Research and write short official, technical or social research report.

2. Create communication material for an organization dedicated to a social cause and use electronic/social media to share concepts and ideas.

3. Present and summarize information, ideas and opinions in a business environment using grammatically correct English.

4. Perform effectively in the placement process.

COURSE DESCRIPTION

The intermediate level course develops succinct written expression for modern business communication with special emphasis on report writing and creating communication material. Concepts of morality, diversity sensitization for teams are also introduced. Students are initiated to the placement process through interview skills and resume writing.

TEXT BOOKS

T1   Raman, M. and Sharma, S; Technical Communication - Principles and Practice, Oxford University Press (2018), New Delhi.

T2   Professional Communication Skills Workbook, 2020.

REFERENCE BOOKS

R1   Murphy, R, English Grammar in Use (Advanced Level – CEFR-B1, B2), 5th Edition, Cambridge University Press (2019), UK.

R2   Hewing, Martin, Advanced Grammar in Use, 4th Edition, Cambridge University Press (2016), UK.

COURSE CONTENT

Unit I:	10 Contact Hours

Reading Skills: Technical Reading
Writing: Introduction to proposals, features of writing a good report, purpose of report writing; difference between business report and engineering report, types of reports-official reports and technical report writing, E-magazine on a Social Cause.
Grammar: Tenses, subject –verb agreement, punctuation
Vocabulary: Contextual Usage - Synonyms, Antonyms, homophones

Unit II:	10 Contact Hours

Identity of Organization – Creating Communication material (Vision, Mission, Values, Branding)
Writing: Media Writing - Press note, business letters, agenda and minutes of meeting, modern forms of communication: e-mails, memorandum, video conference and conference calls.
Grammar: Sentence correction and sentence completion
Vocabulary: Idioms, collocations

Unit III:	10 Contact Hours

Introduce key concepts of Morality, Diversity & Inclusion, Case Study
Writing: Paragraph writing, summarizing, describing objects and processes, proofreading
Interview Skills: Types of Interviews, cover letter and resume writing
Grammar: Para completion, sentence rearrangement, close test
Vocabulary: Analogy
Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	**Course Outcome (CO)**	**Mapped Programme Outcome (PO)**
1	Research and write short official, technical or social research report.	10
2	Create communication material for an organization dedicated to a social cause and use electronic/social media to share concepts and ideas.	10
3	Present and summarize information, ideas and opinions in a business environment using grammatically correct English.	10
4	Perform effectively in the placement process.	10

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20PCT154	**Professional Communication Skills**	0	0	0	0	0	0	0	0	0	3	0	0

1=addressed to small extent

2= addressed significantly

3=major part of course

20CST151	Object Oriented Programming Using C++	L	T	P	S	C	CH
Version 1.00		0	2	0	0	2	
Pre-requisites/ Exposure	Basic knowledge of Computer Programming						
Co-requisites							

COURSE OBJECTIVES
1. To enable the students to understand various stages and constructs of C++ programming language and relate them to engineering programming problems.
2. To improve their ability to analyze and address variety of problems in programming domains.

COURSE OUTCOMES
After studying this course student will be able to

1. Provide the environment that allows students to understand object-oriented programming Concepts. Basics of Probability distribution.

2. Demonstrate basic experimental skills for differentiating between object-oriented and procedural programming paradigms and the advantages of object-oriented programs. Classification of Stochastic processes

3. Demonstrate their coding skill on complex programming concepts and use it for generating solutions for engineering and mathematical problems. Discrete parameter Markov Chains

4. Develop skills to understand the application of classes, objects, constructors, destructors, inheritance, operator overloading and polymorphism, pointers, virtual functions, templates, exception handling, file operations and handling. Continuous parameter Markov Chains.

COURSE DESCRIPTION
The course begins with the introduction to features of object-oriented programming and its applications in numerous fields. After covering fundamentals, students will learn how to apply the more complex concepts including Inheritance, Polymorphism and File Handling in order to solve the complex real-world problems.

TEXT BOOKS
T1   E Balagurusamy., "Object Oriented Programming in C++", Tata McGraw-Hill.

T2	Robert Lafore, "Object Oriented Programming in C++", Waite Group.

REFERENCE BOOKS

R1	Herbert Schildt , "C++- The Complete Reference", Tata McGraw-Hill 2003, New Delhi.
R2	Bjarne Stroustrup: "The C++ Programming Language" (4th Edition). Addison-Wesley.
R3	Ravichandran , "Programming with C++",Tata McGraw-Hill Education.
R4	Joyce M. Farrell," Object Oriented Programming Using C++", Learning.
R5	Programming Languages: Design and Implementation (4th Edition), by Terrence W. Pratt, Marvin V. Zelkowitz, Pearson.
R6	Programming Language Pragmatics, Third Edition, by Michael L. Scott, Morgan Kaufmann.

COURSE CONTENT

Unit I: Fundamentals of C++	10 Contact Hours

Fundamentals of C++: Features of object-oriented programming, Difference between object oriented and procedure-oriented programming, Difference between structure and class, Data types. Input and output streams (cin, cout), introduction to namespace.

Classes and Objects: Specifying a class, creating objects, accessing class members, defining a member function inside and outside class, access specifiers, inline function, static data members & member functions. Objects as function arguments, friend function, returning objects to functions.

Constructors and Destructors: Need for constructors, types of constructors: default, parameterized, copy constructor, order of execution of constructors, destructors and their need.

Unit II: Inheritance, Polymorphism & Exception Handling	10 Contact Hours

Inheritance: Defining derived class, modes of inheritance, types of inheritance, ambiguity in inheritance, virtual base class, Function overriding, Member Classes: Nesting of Classes.

Polymorphism: Introduction & types of polymorphism, Function overloading, operator overloading, rules for overloading operators, overloading of unary & binary operators, Constructor Overloading.

Exception Handling: Try, Throw, Catch, Throwing an Exception, Catching an Exception.

Unit III: Pointers, Virtual Functions, DMA & Files	10 Contact Hours

Pointers, Virtual Functions: Declaring & initializing pointers, pointer to objects, this pointer, pointer to derived classes, static and dynamic binding.

Dynamic memory allocation: Dynamic memory allocation using new and delete operator.

Files: Introduction to File streams, Hierarchy of file stream classes, File operations, File I/O, File opening Modes, Reading/Writing of files, Random-access to files.

Mode of Evaluation: The performance of students is evaluated as follows:

20CST151	Object Oriented Programming Using C++	L	T	P	S	C	CH
Version 1.00		0	2	0	0	2	
Pre-requisites/ Exposure	Basic knowledge of Computer Programming						
Co-requisites							
	Theory						

Components	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	40	60
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Basics of Probability distributions	1, 2, 5, 8, 12
2	Classification of Stochastic processes	1-3, 5, 8, 11, 12
3	Discrete parameter Markov Chains	1-3, 5, 8-12
4	Continuous parameter Markov Chains	1-3, 5, 7-12

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		Engineering Knowledge	Problem analysis	Design/development of	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12

20CSP152	Object Oriented Programming Using C++ Lab	L	T	P	S	C	CH
Version 1.00		0	0	4	0	2	
Pre-requisites/ Exposure	Basic knowledge of Computer Programming						
Co-requisites							

COURSE OBJECTIVES

1. To enable the students to understand various stages and constructs of C++ programming language and relate them to engineering programming problems.
2. To improve their ability to analyze and address variety of problems in programming domains.

COURSE OUTCOMES

After studying this course student will be able to

1. Provide the environment that allows students to understand object-oriented programming Concepts. Basics of Probability distributions

2. Demonstrate basic experimental skills for differentiating between object-oriented and procedural programming paradigms and the advantages of object-oriented programs. Classification of Stochastic processes

3. Demonstrate their coding skill on complex programming concepts and use it for generating solutions for engineering and mathematical problems. Discrete parameter Markov Chains

4. Develop skills to understand the application of classes, objects, constructors, destructors, inheritance, operator overloading and polymorphism, pointers, virtual functions, templates, exception handling, file operations and handling. Continuous parameter Markov Chains

COURSE DESCRIPTION

The course begins with the introduction to features of object-oriented programming and its applications in numerous fields. After covering fundamentals, students will learn how to apply the more complex concepts including Inheritance, Polymorphism and File Handling in order to solve the complex real-world problems.

TEXT BOOKS
-   **T1**   E Balagurusamy., "Object Oriented Programming in C++", Tata McGraw-Hill.
-   **T2**   Robert Lafore, "Object Oriented Programming in C++", Waite Group.

REFERENCE BOOKS
-   **R1**   Herbert Schildt , "C++- The Complete Reference", Tata McGraw-Hill 2003, New Delhi.
-   **R2**   Bjarne Stroustrup: "The C++ Programming Language" (4th Edition). Addison-Wesley.
-   **R3**   Ravichandran , "Programming with C++",Tata McGraw-Hill Education.
-   **R4**   Joyce M. Farrell," Object Oriented Programming Using C++", Learning.
-   **R5**   Programming Languages: Design and Implementation (4th Edition), by Terrence W. Pratt, Marvin V. Zelkowitz, Pearson.
-   **R6**   Programming Language Pragmatics, Third Edition, by Michael L. Scott, Morgan Kaufmann.'

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COURSE CONTENT

Unit I: Fundamentals of C++ **10 Contact Hours**

Practical 1.1:WAP to find the area of a triangle using Heron's Formula when three sides of the triangle are input by user.

Practical 1.2:A person walks x km toward east and turns to the right. Then he moves y km. WAP to find the distance between starting and final point. Values of x and y are input by user.

Practical 2.1: Program to generate the Fibonacci series up to user specified limit. Write all the missing terms (e.g. 4, 6, 7, 9, 10, 11, 12, 14, 15…) also at the end.

Practical 2.2:WAP to input a matrix of dimension 4x4. If base address is 1000. Find the address of given element of the matrix.

Practical 3.1: Create a class called employee that contains a name (an object of class string) and an employee number (type long). Include a member function called getdata() to get data from the user, and another function called putdata() to display the data. Assume the name has no embedded blanks. Write a main() program to exercise this class. It should create an array of type employee, and then invite the user to input data for up to 100 employees. Finally, it should print out the data for all the employees.

Practical 3.2:WAP to add two complex numbers using class and objects.

Practical 4.1:WAP to add two objects of type time using constructor and destructor in the format 11:59:59.

Practical 4.2:WAP to find area of rectangle using parametrized constructor.

Unit II: Inheritance, Polymorphism & Exception Handling **10 Contact Hours**

Practical 5.1:WAP to explain all Inheritance types.

Practical 5.2:WAP to illustrate ambiguity in multiple Inheritance and resolve using scope resolution operator.

Practical 5.3:WAP to resolve the diamond ambiguity using virtual base class.

Practical 6.1:WAP to calculate and display cube of an integer and decimal number using function overloading.

Practical 6.2: Program to demonstrate the unary operator overloading for operator ++. Make a class test. Create a default constructor to initialize the variable. Make a member function for operator ++ with definition to decrement the value of variable.

Practical 6.3: Create a class that imitates part of the functionality of the basic data type int. Call the class Int(note different spelling). The only data in this class is an int variable. Include member functions to initialize an Int to 0, to initialize it to an int value, to display it (it looks just like an int), and use operator overloading to add two Int values. Write a program that exercises this class by creating two initialized and one uninitialized Int values, adding these two initialized values and placing the response in the uninitialized value, and then displaying this result.

Practical 7.1:WAP to perform exception handling for Divide by zero Exception.

Practical 7.2:WAP to handle various exception handlings.

Unit III: Pointers, Virtual Functions, DMA & Files **10 Contact Hours**

Practical 8.1: Write a program that reads a group of numbers from the user and places them in an array of type float. Once the numbers are stored in the array, the program should average them and print the result. Use pointer notation wherever possible.

Practical 8.2:WAP to implement function overriding using virtual functions.

Practical 9.1: Program to understand the concept of new and delete operator.

Practical 9.2: Write a program to store the information of about 5 students in a file and read the contents and print them on screen.

Practical 10.1:WAP to demonstrate tellg() and tellp() functions.

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	**Continuous Internal Assessment (CAE)**	**Semester End Examination (SEE)**
Marks	40	60
Total Marks	100	

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Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Basics of Probability distributions	1, 2, 5, 8, 12
2	Classification of Stochastic processes	1-3, 5, 8, 11, 12
3	Discrete parameter Markov Chains	1-3, 5, 8-12
4	Continuous parameter Markov Chains	1-3, 5, 7-12

		Engineering Knowledge	Problem analysis	Design/development of	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20CSP152	Object Oriented Programming Using C++ Lab												

1=addressed to small extent

2= addressed significantly

3=major part of course

20PCP158	Professional Communication Skills Lab	L	T	P	S	C	CH
Version 1.00		0	0	2	0	1	30
Pre-requisites/ Exposure	Studied Communication Skills Lab Course						
Co-requisites	**20PCT154**						

COURSE OBJECTIVES

The Course aims to:

1. Prepare students for their careers through proficient use of English in professional and interpersonal communication in the globalized context.

2. Inculcate soft skills and a professional attitude in the student.

3. Impart expertise for effective presentation skills.

COURSE OUTCOMES

On completion of this course, the students are expected to

1. Give presentations in English confidently using appropriate tools.
2. Illustrate effective soft skills while negotiating ethically in professional situations.
3. Use neutral accent in English with correct pronunciation.

COURSE DESCRIPTION

The course aims to make students use information to practice strategic discourse. It will prepare them for the transition from academia to industry.

TEXT BOOKS

T1   Globarena EL- Client Software for Communication Skills, Hyderabad

COURSE CONTENT

Unit I:	10 Contact Hours

Soft Skills: Critical Thinking Skills, Creativity Skills
Presentation Skills: Elements & structure of effective presentation, preparation of presentation
Speaking Skills: Presentation on a given topic, extempore, cross talk, paper reading
Reading Skills: Technical Reading – inferring meaning, critical reading: exercise 7-8
Listening Skills: Listening exercises for word stress and pronunciation -3 & 4
El Client Software: Parts of Speech, subject–verb agreement, tenses – contextual usage exercises
Phonetics: Vowel sounds practice with speaking on software

Unit II:	10 Contact Hours

Soft Skills: Problem Solving Skills, Professional Ethics & Values
Speaking Skills: Group discussion, poster making and presentation, news discussion
Phonetics: Consonant Sounds practice with speaking on software
El Client Software: Correction of Sentences, Common Errors in English exercises
Listening Skills: Listening exercises for word stress and pronunciation -5 & 6

Unit III:	10 Contact Hours

Soft Skills: Negotiation Skills, Telephone Etiquette, Interview Skills- Interview Skills
Vocabulary building: one-word substitutes, analogy
Phonetics: Diphthongs sounds practice
Listening Skills: Listening exercises for word stress and pronunciation -7 & 8

Mode of Evaluation: The performance of students is evaluated as follows:

	Practical	
Components	**Continuous Internal Assessment (CAE)**	**Semester End Examination (SEE)**
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
SN	**Course Outcome (CO)**	**Mapped Programme Outcome (PO)**
1	Give presentations in English confidently using appropriate tools.	10
2	Illustrate effective soft skills while negotiating ethically in professional situations.	10
3	Use neutral accent in English with correct pronunciation.	10

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		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20PCP158	Professional Communication Skills Lab	0	0	0	0	0	0	0	0	0	3	0	0

1=addressed to small extent

2= addressed significantly

3=major part of course

20MEP116/20MEP156	Workshop Practice Trades (CSE, ECE, EE) (Fitting Shop, Electrical Shop, Electronics Shop)	L	T	P	S	C	CH
Version 1.00		0	1	2	0	2	30
Pre-requisites/ Exposure	Nil						
Co-requisites							

COURSE OBJECTIVES

To familiarize the students with various tools and operation in manufacturing like Fitting, Electrical and electronics.

COURSE OUTCOMES

Student will be able to:

1. Familiarize the students with various tools & safety precautions as per the floor shops
2. To impart practical knowledge to perform basic operations & prepare an accurate job
3. Learn the applications of tools & processes in daily life routine tasks.

COURSE DESCRIPTION

The course begins with the introduction to various tools and operation in manufacturing likeFitting Shop, Electrical Shop, Electronics Shop andits application in numerous fields. After experiments students will learn how to apply the more complex real-world problems.

Text Books:

1. Singh Swarn, Workshop Practice by S. Chand and Sons.

Reference Books

1. ChaudhuryHazra ,Workshop Technology, vol I, Media Promoters & Publication

2. Raghuvanshi B. S Workshop Technology, vol I, Dhanpatrai and Sons

COURSE CONTENT

Unit I: Fitting Shop	10 Contact Hours

Fitting Shop: Students to learn the use of Fitting Hand Tools, Marking Tools, Measuring Tools and Gauges etc.Exercises: Involving Jobs made out of MS Flats, to make a Square Fitting Job & a Triangular Fitting job Involving operations like Hacksawing, Marking, Filing, Drilling, Tapping and Radiusing etc.

Unit II: Electrical and Electronic Shop	10 Contact Hours

Electrical & Electronics Shop: Introduction to tools and electrical accessories. Exercises: Including preparation of Stair Case wiring and Full Wave Centre Tap Rectifier, Involving the assembling of electronic components on PCB's using soldering.

Unit III: Computer and its accessories shop	10 Contact Hours

Introduction to PC, Motherboard and other components, accessories. Includes assembling and disassembling of Personal Computer.

List of experiments:

1. To make a 'T' part of Square Fitting Job involving different operations like, marking, measuring, punching, hack sawing, filing and squaring etc.
2. To make a U part of Square Fitting Job involving different operations like, marking, measuring, punching, hack sawing, filing and squaring etc.
3. Identification of electrical and electronics components: Resistors, Capacitors, Inductors, Diodes, Transistors.
4. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (Open Source Tools such as Dia or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
5. Inter-connection methods and soldering practice:Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general-purpose PCB, Crimping.
6. Operation of Protective & Safety devices: Fuse, MCB, ELCB, Relay.
7. Troubleshooting of domestic devices: Dismantling, Repairing, Assembling and testing of domestic appliance like electric iron, Room heater, Electric toaster, Water heater, Electric kettle, Electric oven, Regulators, Alarm bell.
8. Motor: Demo model of Motor Principle, Assembly & Disassembly of different motors, Basic Troubleshooting of different motors, Voltage, Current, Power & Speed measurement of various motors
9. **Introduction to PC Hardware:** Types of Memories- Static RAM and Dynamic RAM, ROM, PROM, EPROM, EEPROM, CPU (Central Processing Unit) – ALU
10. **Assembling, Disassembling of PC**: Assembling and Disassembling of Personal Computer.

Mode of Evaluation: The performance of students is evaluated as follows:

	Practical	
Components	**Continuous Internal Assessment (CAE)**	**Semester End Examination (SEE)**
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and Pos		
S N	**Course Outcome (CO)**	**Mapped Programme Outcome (PO)**
1	**Knowledge of Fitting Shop**	1, 5,9,12
2	**Electrical and Electronic Shop**	1, 5,9,12
3	**Computers and Accessories Shop**	1,5,9,12

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		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
20MEP1 16/156	Work-shop Practice	3				3				3			2

1=addressed to small extent

2= addressed significantly

3=major part of course

20ECP153	Foundations of ARTIFICIAL INTELLIGENCE LAB	L	T	P	S	C	CH
Version 1.0		0	0	2	0	1	2
Pre-Requisites/ Exposure				None			
Co-requisites				None			

COURSE OBJECTIVE

To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: search, knowledge representation, inference, logic, and learning.

COURSE OUTCOMES

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

1. Identify problems where artificial intelligence techniques are applicable.

2. Apply artificial intelligence techniques in applications which involve perception, reasoning and learning.

3. Develop simple intelligent system using available tools and techniques of AI to analyze and interpret domain knowledge.

COURSE CONTENT

Introduction Session

⬚ Introduction to ARM v8 64-bit SoC with open-source Linux-based OS, to be utilized as the core of all below-mentioned tasks/ projects.

⬚ Introduction to an open-source AI hardware platform for vision, speech and text analysis.

List of Tasks/ Micro-projects

⬚⬚Understand program flow control in Python.

⬚⬚Explore functions, list, tuples & ranges in Python.

⬚⬚Derive insights from images in the cloud using pre-trained Vision API models to detect emotion and understand text.

⬚⬚Perform Speech-to-text conversion using pre trained machine learning API models for short-form or long-form audio.

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Derive insights from unstructured text using machine learning custom models to classify, extract, and detect sentiments.

Create an artificial intelligence powered ChatBot to mimic human interactions for e-commerce.

Create a service ChatBot that responds with relevant data in a conversation for Educational institutions.

Explore, visualise, transform and summarise input datasets for building classification models.

Predict whether or not it will rain tomorrow by training a binary classification model.

Predict outcome of individual items located in groups to classify iris species.

Develop an engineered solution to socially relevant problem(s) with technical report.

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Mode of Evaluation: The performance of students is evaluated as follows:

Theory		
Components	Continuous Internal Assessment (CIA)	Semester End Examination (SEE)
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
S. No.	Course Outcome (CO)	Mapped Program Outcome (PO)
1.	Identify problems where artificial intelligence techniques are applicable.	2, 3, 6, 9
2.	Apply artificial intelligence techniques in applications which involve perception, reasoning and learning.	2, 3, 4, 5
3.	Develop simple intelligent system using available tools and techniques of AI to analyze and interpret domain knowledge.	2, 3, 4, 5

Engineering knowledge	Problem analysis	Design/ Development of solutions	Conduct Investigations of complex problems	Modern Tool Usage	The engineer and society	Environment and sustainability	Ethics	Individual or Team Work	Comunication	Project management and finance	Life-long learning
1	2	3	4	5	6	7	8	9	10	11	12
Foundation of Artificial Intelligence Applications Lab	3		3		2		2		1		2	

1 = Addressed to small extent
2 = Addressed significantly
3 = Major part of the course

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20UCY196	Life Skills and Mentoring-2	L	T	P	S	C	CH
		0	1	0	0	0	1.0
Pre-requisites/ Exposure	NA
Co-requisites	

COURSE OBJECTIVE
1. To identify specific needs of student-Academic, Personal, Adjustment related and provide counselling.
2. To help students build strength of character, ethics and values. Counselling students and provide confidence to improve their quality of life. To enable the parents to know about the performance and regularity

COURSE OUTCOMES
On completion of this course, the students will be able to
3. Develop relationship around mentee's specific learning goals.
4. Provide objective feedback – focus on concrete actions and behavior in order to support mentee growth and development.
5. Share personal experience – openly disclose past and current experiences, successes, challenges, and lessons learned.

COURSE DESCRIPTION
The course will build the capability to help in developing self awareness and sensitivity, feeling of equality, compassion and oneness.
Text Books:
1.   Mentoring Programme Handbook, Chandigarh University, 2019
Reference Books:
1   Daniel Goleman (2012). Working with Emotional Intelligence. Bloomsbury Publishing India Private Limited

Web Resources:
1. http://www.skillsyouneed.com/ips/improving-communication.
2. https://www.mindtools.com/
3. www.psychologytoday.com

COURSE CONTENT
UNIT-I   **4 Contact Hours**
   Positive Attitude: Understanding positive attitude; List of positive attitudes; Characteristics and Traits of a Positive Mindset; Outcomes of a positive Attitude; Tips on How to Have & Keep a Positive Mindset in Life and at Work; Assessment of Positive Attitude
   Anger Management: Understanding Anger Management; Unhelpful Angry Behavior; Techniques To Manage Your Feelings.
   Healthy Relationships: Understanding Healthy Relationships; Keys of Healthy Relations; Building Healthy Relationships
UNIT-II   **4 Contact Hours**
Character Strength: Understanding Character Strength; What are major virtues by which we judge a person's actions and character? Focusing on your strengths; Use strength to boost happiness
Human Aspirations: Understanding basic human aspirations
Social Responsibility: Understanding Social Responsibilities; Contributing and connecting with the society
Assertiveness: Understanding assertiveness; Benefits of assertiveness; Learning when to Be Assertive

UNIT-III   **4 Contact Hours**
Happiness and Gratitude: Understanding happiness and Gratitude; factors that affect our happiness; Interesting Facts and Findings about happiness; Useful tips for happiness; Benefits of gratitude; Modern Psychological Perspectives on Gratitude; how Happiness and Gratitude is related to well being
Human Dignity: Understanding Human Dignity; Fundamental rights of a person
Earth, Our Home: Our Role and Relationship with Nature

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	Continuous Internal Assessment (CAE)	Semester End Examination (SEE)
Marks	NA	NA
Total Marks	NA	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

	Mapping Between COs and Pos	
SN	Course Outcome (CO)	Mapped Programme Outcome (PO)
1	Knowing Happiness and Gratitude, Its Impact and benefits. Understanding Human Dignity and fundamental rights of human beings. Knowing our roles and responsibility towards environment and nature.	1, 2,3,4
2	Knowing your character strength and using it to build a happy life. Understanding basic human aspirations and its different dimensions. Understanding social responsibilities and their effect on individuals and society. Knowing to be more assertive to enhance our communication skills.	1, 2,3,4
3	Understanding to build positive mindset in life. Understanding and managing anger effectively. Understanding the importance of healthy relationships and building healthy relations.	1, 2, 3,4

1.

		1	2	3	4	5	6	7	8	9	10	11	12
20UCY196	**Life Skills and Mentoring-2**												

1=addressed to small extent
2= addressed significantly
3=major part of course

20ECP158	**Applied Digital Electronics Lab**	L	T	P	S	C	CH
Version 1.0		0	0	2	0	1	2
Pre-Requisites/ Exposure	None						
Co-requisites	None						

COURSE OBJECTIVE

To conceive, analyze, design and build combinational and sequential digital logic solutions for everyday problems.

COURSE OUTCOMES

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

1. **identify** relevant information to the supplement the digital system design.
2. **analyze** the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra.

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3. **design** digital systems based on concepts that enable autonomous behavior.
4. **prepare** professional quality textual and graphical presentations.
5. **work** in a team that can propose, design, implement and report on digital systems' project.

COURSE CONTENT

1. Validationoftruthtablesoflogicgates(7400,7402,7404,7408,7432,and 7486).

2. (a) Designa burglar alarm(AND).

   (b) Designa single doorbellringer forbothfrontandbackdoors(OR).

   (c) Designanautomaticfancontroller (NOT).

3. (a) Designa two-wayswitchfor roomlight(XOR).

   (b) DesignanLEDFlasher (NAND).

   (c) Designa multiplayer game trigger mechanism(NOR).

4. Designa lightbasedobjectcounter with7-segmentdisplay.

5. Design a pulse width modulated signals generator using 555.

6. Designa traffic light system usingDFlip-Flop.

7. Designa home appliance control system with3-to-8 decoder.

8. Designa stressmeasuringgame using decade counter.

9. Designa multiple sensor data acquisitionsystemusingmultiplexer.

10. Designa rollingLEDdisplayusingMAX7219shiftregister.

11. Project with technical report.

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Theory	
	Continuous Internal Assessment (CIA)	**Semester End Examination (SEE)**
Marks	60	40
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping Between COs and POs		
S. No.	**Course Outcome (CO)**	**Mapped Program Outcome (PO)**
1.	**identify** relevant information to the supplement the digital system design.	1,2,4,5,7,9,10
2.	**analyze** the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra.	1,3,4,5,6,8,9,10,11,12
3.	**design** digital systems based on concepts that enable autonomous behavior.	1,2,3,4,6,7,8,9,12
4.	**prepare** professional quality textual and graphical presentations.	1,2,3,4,5,6,7,8,9,10,11,12
5.	**work** in a team that can propose, design, implement and report on digital systems' project.	1,2,3,4,5,6,7,8,9,10,11,12

		Engineering knowledge	Problem analysis	Design/ Development of solutions	Conduct Investigations of complex problems	Modern Tool Usage	The engineer and society	Environment and sustainability	Ethics	Individual or Team Work	Communication	Project management and finance	Life-long learning
		1	2	3	4	5	6	7	8	9	10	11	12
20ECP158	**Applied Digital Electronics Lab**	3	2	2	3	2	2	3	2	3	2	2	3

1 = Addressed to small extent
2 = Addressed significantly
3 = Major part of the course

Syllabi & Courses Offered from Management Technology

List of Management Courses

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20UCT221	Introduction to Management and Leadership :	2	0	0	0	2	2		
2	20UCT213	Creativity and Critical Thinking	2	0	0	0	2	2		
		Total	**4**	**0**	**0**	**0**	**4**	**4**		

Syllabi & Courses Offered from Humanities

List of Humanities Courses

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20UCY222	Life Skills and Mentoring : **MNG**	0	1	0	0	1	1		
2	20UCX224	Entrepreneurship : **MNG**	0	0	0	2	1	2		
3	20UCY265	Life Skills and Mentoring : **MNG**	0	1	0	0	1	1		
4	20CST413	Environmental Science and Disaster Management : **MNG**	2	0	0	0	2	2		
5	20UCY146	Life Skill and Mentoring-1: **MNG**	0	1	0	0	1	1		
6	20UCY196	Life Skills and Mentoring-2 : **MNG**	0	1	0	0	1	1		
7	20PCT154	Professional Communication Skills	0	2	0	0	2	2		
8	20PCP158	Professional Communication Skills Lab	0	0	2	0	1	2		
		Total	**2**	**6**	**2**	**2**	**10**	**12**		

SECTION 3B
Syllabi for Programme Specific Courses
Syllabi & Courses Offered from CSE Engineering

List of Programme Core Courses

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST211	Data Structures	3	0	0	0	3	3		
2	20CST212	Computer Organization & Architecture	3	0	0	0	3	3		
3	20CST214	Database Management System	3	0	0	0	3	3		
4	20CST218	Java Programming	2	0	0	0	2	2		

5	20CSP212	Data Structures Lab	0	0	4	0	2	4		
6	20CSP215	Database Management System Lab	0	0	2	0	1	2		
7	20CSP219	Java Programming Lab	0	0	2	0	1	2		
8	20CST252	Microprocessor & Interfacing	3	0	0	0	3	3		
9	20CST254	Software Engineering	3	0	0	0	3	3		
10	20CST256	Computer Networks	3	0	0	0	3	3		
11	20CST258	Principles of Artificial Intelligence	3	0	0	0	3	3		
12	20CSP259	Programming in Python Lab	0	0	4	0	2	4		
13	20CST214	Project-I	0	0	1	3	2	4		
14	20CSP253	Microprocessor & Interfacing Lab	0	0	2	0	1	2		
15	20CSP255	Software Engineering Lab	0	0	2	0	1	2		
16	20CSP257	Computer Networks Lab	0	0	2	0	1	2		
17	20CSY225	Institutional/Summer Training: **MNG**	0	0	0	4	2	4		
18	20CST311	Design and Analysis of Algorithms	3	0	0	0	3	3		
19	20CST313	Operating Systems	3	0	0	0	3	3		
20	20CST315	System Programming	3	0	0	0	3	3		
21	20CST316	Machine Learning	3	0	0	0	3	3		
22	20CSR318	Project-II	0	0	1	5	3	6		
23	20CST319	Project Based Learning in Java	2	0	0	0	2	2		
24	20CSP312	Design and Analysis of Algorithms	0	0	2	0	1	2		
25	20CSP317	Machine Learning	0	0	2	0	1	2		
26	20CSP321	Project Based Learning in Java	0	0	4	0	2	4		
27	20CSX322	Institute/Industrial Summer Training : **MNG**	0	0	0	4	2	4		
28	20CST352	Network Operating System	3	0	0	0	3	3		
29	20CST353	Theory of Computation	3	0	0	0	3	3		
30	20CST354	INFORMATION SECURITY AND CRYPTOGRAPHY	3	0	0	0	3	3		
31	20CST355	MOBILE APPLICATION DEVELOPMENT	2	0	0	0	2	2		
32	20CST357	INTERNET OF THINGS	3	0	0	0	3	3		
33	20CSR359	Project-III	0	0	1	5	3	6		
34	20CSP356	MOBILE APPLICATION DEVELOPMENT	0	0	2	0	1	2		
35	20CSP358	INTERNET OF THINGS	0	0	2	0	1	2		
36	20CST411	Cloud Computing	3	0	0	0	3	3		
37	20CST412	BLOCKCHAIN Technology	3	0	0	0	3	3		
38	20CSR414	Project-IV	0	0	1	5	3	6		
39	20CSI415	Industrial Summer Training	0	0	0	4	2	4		
40	20CSR451	Project-V	0	0	1	5	3	6		
Total			57	0	35	35	92			

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List of Programme Elective Courses

SN	Code	Title	L	T	P	S	C	CH	Pre-requisite	Co-requisites
1	20CST331/20CSP336	STATISTICAL INFERENCE USING R	2	0	2	0	3	4		
	20CST332/20CSP337	SOFT COMPUTING								
	20CST333/20CSP338	WEB AND MOBILE SECURITY								
	20CST334/20CSP339	MULTIMEDIA TECHNOLOGIES								
2	20CST371/20CSP376	DATA MINING	2	0	2	0	3	4		
	20CST372/20CSP377	DEEP LEARNING								
	20CST373/20CSP378	WEB TECHNOLOGIES								
	20CST374/20CSP379	UI/UX DESIGN								
3	20CST431/20CSP436	BUSINESS INTELLIGENCE	2	0	2	0	3	4		
	20CST432/20CSP437	COMPUTER VISION								
	20CST433/20CSP438	Software Testing and Quality Assurance								
	20CST434/20CSP439	Digital Image Processing								
4	20CST461	DATA VISUALIZATION	2	0	2	0	3	4		
	20CST462	NATURAL LANGUAGE PROCESSING								
	20CST463	SEARCH ENGINE OPTIMIZATION								
	20CST464	WIRE FRAMING AND UI PROTOTYPING								
5	20CST471	BIG DATA ANALYTICS	2	0	2	0	3	4		
	20CST472	ROBOTIC PROCESS AUTOMATION								
	20CST473	AR/VR SIMULATION								
	20CST474	COMPUTER GRAPHICS								
Total			**10**	**0**	**10**	**0**	**15**			