

SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
LONGOWAL, DISTRICT-SANGRUR

DEPARTMENT OF ECE

Ref. No: SLIET/ECE/8531

Date: 06/12/23

From : HOD(ECE)
To : Dean (Academic)
Subject : Conduct of Academic Audit for ECE Department for the Academic Year 2022-23.

With reference to your letter no. Dean(A)/1579 dated 10.11.23, regarding Academic audit of ECE department for the Academic Year 2022-23, please find enclosed herewith the Academic Audit Report of ECE Department for the year 2022-23.

D.No. Dean (Acad.) 1836

Dated 08/12/2023

Coordinates IQAC
Forwarded

Jasvinder,
08.12.2023


HOD (ECE)

**SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY,
LONGOWAL, DISTRICT SANGRUR
(Deemed to be University)**

DEPARTMENT OF ECE

Ref. No: SLIET/ECE/8531

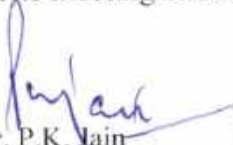
Date: 6/12/23

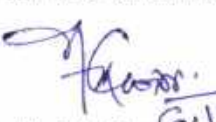
Minutes of Meeting (Academic Audit 2022-23)


With reference to letter no. Dean(A)/1579 dated 10.11.23, A meeting was held on 06.12.2023 at 12.00 Noon in the office of HOD(ECE). The recommendations of committee is as under:

1. The committee emphasized to expedite to develop the Centre of Excellence in potential field of Electronics & Communication Engineering.
2. Few laboratories of the department need to be upgraded and expanded.
 - The Microprocessor & Microcontroller lab may be upgraded by including the advanced Microcontrollers and renamed as Embedded Systems Lab.
 - VLSI Lab & IoT Lab need to be established.
3. Admission to PG and Ph.D. program needs to be further strengthened.
4. More choice based subjects should be offered in the open elective courses.
5. The committee pointed out to chalk out strategies to improve branch perception among the stakeholders.

The meeting ended with vote of thanks to the chair.



Dr. P.K. Jain
Professor (M&H)


Dr. Harish Chopra
Professor (Chemistry)


Dr. Anupma Marwaha
Professor (ECE)


Dr. Kamlesh Prasad
Professor (FET) & Dean
(FSW)


Dr. R.S. Kaler,
Sr. Professor (ECE) & Dean Faculty Affairs
Thapar University, Patiala
External Expert


Dr. Ajay Pal Singh
Professor & HOD(ECE)

Dean (Academic)


SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed-To-Be-University)
LONOGOWAL-148106
ACADEMIC AUDIT (2022 - 2023)
SUMMARY SHEET

1.	Name of the Department	Electronics and Communication Engineering	
2.	Name of Reviewer Designation & Address	From Academia	
		Dr. Ajay Pal Singh Chauhan, HOD (ECE)-Convener Prof. Kamlesh Prasad, Dean (FSW) Dr. Anupma Marwaha, Professor (ECE) Prof. Harish Chopra (Chemistry) Prof. P.K. Jain (Management and Humanities) <u>External Expert:</u> Dr. R. S. Kaler, Prof. (ECE) and Dean Faculty Affairs, Thapar University, Patiala (Punjab)	
3.	Date of Meeting	06.12.2023	

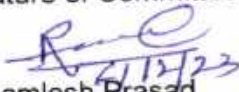
Score Summary								
	Academics (A)				Research (Max Score 100) (B)	Departmental Infrastructure (Max Score 100) (C)	Outcome (Max Score 100) (D)	Total Score (700) (A+B+C+D)
	ICD Programme (Max Score 100) (A.1)	UG Programme (Max Score 100) (A.2)	PG Programme (Max Score 100) (Average of all PG programs) (A.3)	Doctoral Programme (Max Score 100) (A.4)				
Self-Assessment	78	85	88	72	95	95	71	584
Expert-Assessment	75	81	86	70	88	95	71	566

Note: 1. Marks mentioned above are the average of the marks given by the experts.


2. If marks have not been allotted for some attributes by the experts, total score can be scaled to maximum marks.


 Dr. Ajay Pal Singh Chauhan
 HOD (ECE)

Signature of Committee Members:


 Dr. Kamlesh Prasad


 Dr. Anupma Marwaha


 Dr. Harish Chopra


 Dr. P. K. Jain


 Dr. R. S. Kaler

D. Outcomes

D.1	Placement/ higher studies/ Publications/ Consultancy, Ph.D. awarded etc.	Score	
		Self- assessment	Expert assessment
1	i. Placements for ICD ii. Placement of B.Tech. iii. Placement of Masters Student iv. Placement of Ph. D. Students	7	7
2	Average No. of Ph.Ds Awarded per Year	10	10
3	Publications per Faculty in Indexed Journals/Year (Average of last three years)	10	10
4	Average Citations per Faculty/Year (Last-Three Years) (Web of Science/Scopus)	10	10
5	Recognitions; Awards(National/International) to Faculty/Students	4	4
6	Consultancy and Externally Funded Projects	10	10
7	No. of Ph.D. graduates who took Academics as Career (Last 5 Years)	10	10
8	Students offered for higher studies	4	4
9	No. of qualified students NET/GATE/CAT etc (State/Central Civil Services)	4	4
10	Entrepreneurship	2	2
Total Score (out of 100)		71	71

Comments & Suggestions for Improvement

1. Center of excellence in the potential area of electronics and communication engineering must be established.
2. More industry persons should be involved in BOS.
3. Inter-disciplinary research should be enhanced.






8	Adequacy of Offices and Furnishing for Faculty	10	10	Office rooms are sufficient as per strength however further procurement of furniture is needed to meet the requirements.
9	Faculty- Student Ratio	8	8	1:19.9 (Need to improve)
10	Support Staff (Technical/Administrative) Adequacy	9	9	Adequate
Total Score (out of 100)		95	95	

SWOT analysis by the department**Strengths:**

1. Experienced, Dedicated and highly qualified faculty in specialized areas with good number of publications in reputed journals (SCI indexed).
2. MoU with Industry, research institute for dissemination of knowledge and use of their research facilities.
3. Research fellowships to support the research.
4. External funded projects
5. Well established laboratories and high-end research facilities with efficient technical support.
6. Good interactions with outer world.
7. Availability of smart classrooms and departmental library in the Department.
8. Student diversity (cultural/language/academic courses).
9. Attractive research fellowship (QIP/ADF/Visvesvaraya PhD scheme/ Grant in Aid).
10. Student Chapter(s) of Professional Societies (IEI and IEEE)

Weaknesses:

1. Limited consultancy.
2. Limited Industrial visits.
3. Student- Faculty ratio.
4. Limited Interdisciplinary research.

Opportunities:

1. To start new PG program/ minor degree in VLSI or 5G Communications.
2. To start the formal/informal courses related to Precision Agriculture.
3. To address industrial requirements for developing IOT environment towards implementation of 5G wireless communication.

Threats: Admission to PG Program

To augment the existing lab infrastructure new hardware and software equipment's are procured time to time. The lab equipment for potential areas including IOT applications, 5G wireless communications has been procured in the department. TaraNG software, SYNOPSIS Tools, EDA Tools (Siemens and Cadence) for UG and PG students has also been purchased under MAKE IN INDIA mission. Also, for UG project lab specifically various hardware equipment has also been procured.

Also, recently the fire extinguishers have been refilled to meet the safety needs of the lab. In the recent financial year, for each lab fresh consumable has also been procured.

C. Departmental Infrastructure

		Score		Remarks
		Self-Assessment	Marks Obtained	
1	Adequacy of Class Rooms and Multi-Media Facility	9	9	11 classrooms out of which 7 classrooms are equipped with multimedia facilities, sufficient as per strength
2	Availability of Laboratories	10	10	In place
3	Availability of Conference/Seminar Room, etc	9	9	Sufficient as per requirements
4	Availability of Seating Space for Faculty and Research Students	10	10	In place
5	Availability of Internet Services in Research Labs and Class Rooms	10	10	Wi-fi campus
6	Departmental Library and E-Resources	10	10	The library has more than 1000 textbooks and reference books. Apart from the books, the library has also a collection of Ph.D. and M.Tech theses, B.Tech and ICD project reports, and industrial training reports. The library has a reading area wherein the students and staff may go and read the study material.
7	Computing Facilities and Software	10	10	Sufficient number of commercial software's are available for RS, PG and UG students.

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All the faculty and staff members are encouraged to regularly attend the training program. Recently many faculty members have enrolled themselves in AICTE approved comprehensive teachers training programs. Also, recently the BoS have been conducted and subjects like Deep learning, AI and Machine Learning have been approved and incorporated at appropriate level.





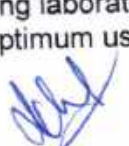
5. Effective/Continuous monitoring of faculty/staff in delivery the course contents (at departmental level) for enhancing the teaching-learning process. To implement it in the ECE department, suggestions are regularly invited from the faculty members regarding revisions in the syllabus, CO-PO mapping, attainment etc. Also, changes suggested by the students, if any, are also taken into consideration. Based on the suggestions received, matters are discussed in the DAAC meeting, and minutes are recorded and forwarded to HOD(ECE) for further consideration in the Board of Studies.
6. Technical Societies/ Colloquium for Students
 - (i) Departmental Society
 - (ii) Student Chapter(s) of Professional Societies (IEI and IEEE)
7. Scope of improvement in the presenting teaching –learning process (Key words: interactive pedagogy (flip classroom, Nitttr module)

In the wake of the challenges posed by the post-COVID era, the scope for improvement in the present teaching-learning process is both pertinent and promising. The pandemic has accelerated the need for innovative approaches to adapting to the changing educational landscape. In this context, the traditional classroom teaching model faces a re-evaluation, offering transformative change opportunities. One promising avenue is the adoption of innovative teaching approaches, such as **flipped classroom learning** and **interactive pedagogy**. Flipped classroom learning redefines the role of in-class and at-home activities, shifting traditional lectures to pre-recorded or online content accessible outside the classroom. This approach allows class time to be dedicated to interactive discussions, problem-solving, and application of knowledge, promoting deeper understanding and engagement.

Interactive pedagogy takes a learner-centric approach, emphasizing active participation, collaboration, and critical thinking. It leverages technology to create a dynamic learning environment that can transcend physical boundaries, enabling students to explore and apply concepts in real-world contexts. Integrating multimedia and peer-to-peer learning encourages students to take charge of their learning journey, fostering a sense of ownership and motivation. The post-COVID era presents an opportunity for educators to embrace these innovative teaching methods and technologies. This transformation not only enhances the quality of education but also equips students with essential skills for the digital age, such as adaptability, problem-solving, and self-directed learning. It underscores the need for institutions to invest in teacher's training, infrastructure, and digital resources to ensure the successful implementation of these approaches.

In conclusion, the post-COVID era has brought the need for reimagining classroom teaching to the forefront. By incorporating innovative teaching approaches like flipped classroom learning and interactive pedagogy, educators can create a dynamic, engaging, and future-ready learning environment that not only overcomes the challenges posed by the pandemic but also enriches the educational experience for students in the long run.

8. Strengthening laboratory infrastructure (adding of new equipment's and use of present facility for optimum use)



Short term goals

- To upgrade laboratories and teaching learning infrastructure.
- Technical Knowledge/skills upgradation of faculties, staffs and students through STCs/workshops.
- Enhancement in industrial interaction and collaborations.

Long term goals

- To start PG program in VLSI.
- To get PG program accredited by the NBA.
- To accomplish consultancy services through industries/research organizations.
- To procure specialized/high end equipment for Microwave Lab equipment, Machine Vision and Motion Control Lab, Wireless Communication, VLSI design and Optical Communication, Internet of Things.

1. Significant achievements of the department (faculty/Staff/Students)

Two faculty members namely Dr Surinder Singh and Dr Dilip Kumar and have been recognized as top 2% scientist in the world as per Stanford University survey.

2. Project funding details

- I. Externally funded research project grant of Rs. 90.88 Lacs for duration of 3½ years by Ministry of Electronics and Information Technology (MeitY), New Delhi under Chips to Start-up (C2S) programme. Chief Investigator : Prof. J S Ubhi and Co-Chief Investigator : Prof. Surinder Singh
- II. Externally funded research project grant of Rs 16.31 Lacs for the duration of 2 years by Science & Engineering Research Board (SERB), New Delhi titled "Design and Development of Terahertz Self-Multiplex Antennas Using Substrate Integrated Waveguide for 6G Wireless Communication System". PI: Dr. Kundan Kumar
- III. Externally funded research project grant of Rs 23.22 Lacs for the duration of 3 years by Science & Engineering Research Board (SERB), New Delhi titled "Design and Development of Noble C-Band Parametric Optical Frequency Comb Generator to Realize Backbone Optical Transport Network for 6G Communication". PI: Prof. Surinder Singh, ECE Department, Co-PI: Prof. J.S. Ubhi

The department has been awarded with NBA accreditation for three years. Also, the institute has been accredited with NAAC A,2022-2023.

3. Placement record of the department (Last three years).

Placement

2020-21: 57 (40 students with documentary proof)

2021-22: 39

2022-23: 33

<http://ece.sliet.ac.in/placement-and-higher-studies-data/>

4. Scope for training of faculty/staff for further strengthening the teaching-learning process for strengthening the curriculum with the addition of new courses having relevance at National and international levels.



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B. RESEARCH

B.1	Research and Industrial collaboration	Score	
		Self-assessment	Expert assessment
1.	Research Ambience in the Department	7	6
2.	Research Awareness among Doctoral Students	10	8
3.	Thrust areas of research in the department	9	9
4.	Quality of Research	9	9
5.	Collaborations with other departments (within the institute) and at National, and International levels.	10	8
6.	Impact and Quality of Publications	10	10
7.	Relevance of Research to Knowledge Generation and Social Relevance	10	10
8.	Student Exposure for Attending Quality Conferences/Symposia	10	10
9.	Inter departmental collaborations	10	8
0.	Industry/externally funded sponsored research (Numbers and amount)	10	10
Total Score (out of 100)		95	88

General Comments on,

Plan of action of the department for the next five years (in view of NEP 2020)

Action Plan (Academic Standard)

The quality of teaching will be improved by:

- Combining existing courses with specific hands-on learning.
- Introducing skill-development courses leading to professional advancement.
- Ensuring student-learning outcomes for each academic program.
- Arranging expert lectures by experienced faculty/scientists from National/International laboratories or institutes. Also, in hand practice by Industry experts on latest practical developments in the subject.
- Organizing seminars, workshops, conferences and industry visits for faculty and students.
- Conducting BoS meeting with external experts.
- Encouraging students to develop industry supported projects.

Action Plan (Student Mentoring)

- Help the students to build confidence in stress free environment through effective counselling.
- Encouraging students to participate in competitive examinations.
- Impart career guidance through an interpersonal engagement by sharing experience and expertise.
- Constructive interaction with a mentor for active participation of students in technical and extra curriculum activities.

3.	Evaluation Process (Continuing Evaluation, and End-Term Evaluation)	10	10
4.	Relevance of contents of courses taught to the students and scope of improvement	10	10
5.	Modern teaching methods in practice other than the conventional method E-Assisted Learning i. Availability of Library Resources and Major Search Engines (like Scopus, Web of Science) ii. Multi-Media Assisted Teaching	8	8
6.	Technical Societies/ Colloquium for Students i. Departmental Society ii. Student Chapter(s) of Professional Societies	8	8
7.	Tour/Training/Industrial visits/Internship opportunities	4	4
8.	Collaboration with other departments (within institute)	8	6
9.	Faculty Mentoring/Faculty Advisor System for Students/Class of Students	10	10
10.	Monitoring and continuous evaluation of the project work assigned to the students (mechanism)	10	10
Total Score (out of 100)		88	86

A. 4	Doctoral (Ph.D.) Programmes	Score	
		Self-assessment	Expert assessment
1.	Intake of Ph.D. Students	10	8
2.	Admission Process	10	10
3.	Pre-Ph.D. Courses and Evaluation Process	10	10
4.	Breadth and Depth of Knowledge of Students	6	6
5.	Seminar/ Presentations and Technical Communication	10	10
6.	Research Facilities available in the Department	8	8
7.	Average No. of Research Students/Faculty	2	2
8.	Average No. of Research Papers of Ph. D. Students (Indexed Journals)	8	8
9.	Average Duration to Complete Ph.D. (years)	4	4
10.	Participation of Research Scholars in Conferences/Workshops	4	4
Total Score (out of 100)		72	70

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Academic Audit Proforma of Assessment

8.	Practical activities, non-academic and totally related to a specific trade for skill development and <i>developing expertise in a particular group of techniques.</i>	8	8
9.	Linkage of ICD programs to outcome based vocational education (Industry linkage)	6	6
10.	Availability of workshop type lab/laboratory for providing hand on training to the students for skill development	8	6
Total Score (out of 100)		78	75
A.2	UG Programme	Score	
		Self-assessment	Expert assessment
1.	Curriculum (Structure, Course syllabi, Flexibility, Choice based credit system)	10	8
2.	Status of study material developed by faculty for students	8	6
3.	Relevance of contents of courses taught to the students and scope of improvement (revision of syllabus, addition of new experiments)	8	8
4.	Formal academic load on students [Teaching, Laboratory/Practical, Projects(minor/major)]	10	10
5.	Modern teaching methods in practice other than the conventional methods E-Assisted Learning (i) Availability of Library Resources (ii) Multi-Media Assisted Teaching	10	10
6.	Evaluation Process (Continuing Evaluation, and End-Term Evaluation) (i) Theory and tutorial (ii) Practical (case studies)	10	10
7.	Faculty-Student Interaction (Whether any slot is fixed for the students to interact with a teacher, after classes/labs)	8	8
8.	Tour/Training/Industrial visits/Internship opportunities	4	4
9.	(a) Effectiveness of Assisted Learning in Tutorial classes/seminars for Students	10	10
	(b) Faculty Mentoring/Faculty Advisor System for Students/Class of Students	8	8
10.	Placement %age/higher studies options (last three years)	8	8
Total Score (out of 100)		85	81
A.3	PG Programme (Separate for each programme)	Score	
		Self-assessment	Expert assessment
1.	Curriculum (Structure, Course Syllabi, Flexibility)	10	10
2.	Formal Academic Load on Students [Teaching, Laboratory/Practical, Projects(minor/major)]	10	10

SANT LONGOWAL INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed-To-Be-University)
LONOGOWAL-148106

ACADEMIC AUDIT (2022 - 2023)
PROFORMA OF ASSESSMENT

1. Name of the Department: **Electronics and Communication Engineering**

Reviewer (Name, Designation & Address):

- Dr. Ajay Pal Singh Chauhan, HOD (ECE)-Convener
- Prof. Kamlesh Prasad, Dean (FSW)
- Dr. Anupma Marwaha, Professor (ECE)
- Prof. Harish Chopra (Chemistry)
- Prof. P.K. Jain (Management and Humanities)

External Expert:

Dr. R. S. Kaler, Prof. (ECE) and Dean Faculty Affairs, Thapar University, Patiala (Punjab)

2. Date of Review: **06.12.2023**

NOTE:

- i. Please grade in the box provided for the following parameters in the range of 1-10 with 10 being the highest.
- ii. Leave 'blank' for 'No Comment'.
- iii. Kindly give your opinion on the strength and weakness of the Department and your suggestions for future growth.

A. ACADEMICS

A.1	ICD Programme	Score	
		Self-assessment	Expert assessment
1.	Curriculum (Structure, Course Syllabi, Flexibility), Theory/practical (contents/ratio).	6	6
2.	Equivalence and Relevance of curriculum at national level	8	8
3.	Formal Academic Load on Students [Teaching, Laboratory/Practical, Projects(minor/major)]	10	10
4.	Evaluation Process (Continuing Evaluation, and End-Term Evaluation)	10	10
5.	Tour/Training/Industrial visits/Internship opportunities provided during the year	4	4
6.	Effectiveness of Assisted Learning, Tutorial System for ICD Students/ Seminars (Refer Course File)	8	7
7.	Faculty Mentoring/Faculty Advisor System for Students/Class of Students	10	10

A. ACADEMICS

A.1 ICD Programme

1. Curriculum (structure, course Syllabi, Flexibility), Theory/Practical (Contents/ratio)

Structure: As most of the educational institutions, the teaching-learning process of SLIET Longowal is defined in terms of course credits, one credit being approximately equal to 1 hour of lecture class or 2-4 hours of laboratory per week. The duration of the course leading to ICD program will ordinarily be three years. The 3-year ICD-programme consists of 142 credits including lectures, tutorials, practical and design work, project work, and special academic activities like in-house summer training, industrial training etc.

Theory/Practical: It has separate courses for theory and laboratory components in the form of (3-0-0) or (3-1-0) theory courses and (0-0-4) laboratory courses. Most of the subjects have one or two tutorial classes to enhance the numerical competency of the students related to respective subjects. The percentage of contact hours for theory and practical courses is approx. 60% and 40%.

Course Syllabi: A course syllabus is an academic document that communicate information about the specific course. The curriculum for the program is basically designed by the members of the Board of Studies (BOS) as per the guidelines issued by AICTE/UGC time to time and approved by the Senate of the institute. The curriculum is periodically revised by the members of BOS according to the inputs from the faculty members teaching that subject as well as from faculties doing research work in that area and feedbacks of the stakeholders, industry requirements and latest technologies. During every revision, the members of BOS suggest changes in the curriculum if any, which are then approved by the Senate.

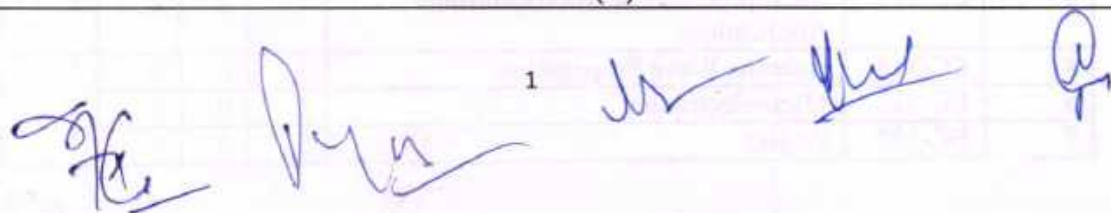
Flexibility: The SLIET system offers two exit modes: first after completing two-year (by taking certificate, earning 96 credits) and another one after completion of full course (by taking diploma, earning 142 credits).

Remarks: Choice based credit is lacking and OBE is not implemented.

The detailed course scheme is given below:

Semester-I							
S. No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1.	AM-111	Mathematics- I	4	1	0	5	5
2.	PH-111	Physics-I	4	0	2	6	5
3.	CY-111	Chemistry-I	4	0	2	6	5
4.	HU-111	Communication Skills-I	2	0	0	2	2
5.	EE-111	Fundamental of Electrical Engineering	3	0	2	5	4
6.	WS-122	Workshop Practice	0	0	4	4	2
7.	EC-112	Electronic Devices	2	0	2	4	3
Total			19	1	12	32	26
Semester-II							
S. No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-121	Mathematics- II	4	1	0	5	5
2	PH-121	Physics-II	4	0	2	6	5
3	CY-121	Chemistry-II	4	0	2	6	5
4	ME-121	Engineering Drawing	0	0	4	4	2
5	EC-121	Digital Electronics	3	0	4	7	5
6	EC-122	Electronic Workshop Practice-I	0	0	4	4	2
Total			15	1	16	32	24
Semester-III (A)							

1



	TP-201	Two Weeks Practical Training during summer vacations				80	S/US
Semester-III (B)							
S. No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	HU-211	Communication Skills-II	1	0	2	3	2
2	CS-216	Computer Fundamentals	3	0	2	5	4
3	EC-213	Electronic Measurements & Instrumentations	3	1	2	6	5
4	EC-214	Analog Communication	3	1	2	6	5
5	EC-217	Consumer Electronics	3	1	0	4	4
6	EC-218	Troubleshooting of Electronics Equipment-I	0	0	4	4	2
7	MC-211	Moral values and Professional ethics	1	0	0	1	0
Total			14	3	12	29	22
Semester-IV							
S. No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-221	Applied Mathematics	3	1	0	4	4
2	EC-223	Fundamentals of Microprocessor & Microcontroller	3	1	4	8	6
3	EC-226	Computer Programming & Application	3	0	2	5	4
4	EC-227	Service & Maintenance of Computer	2	0	4	6	4
5	EC-228	Network Theory	3	1	0	4	4
6	EC-229	Troubleshooting of Electronic Equipment-II	0	0	4	4	2
Total			14	3	14	31	24
Semester-V(A)							
	TP301	Four Weeks Industrial Training during summer vacations				160	
Semester-V (B)							
S. No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	MC-311	Environmental Studies	2	0	0	2	2
2	HU-311	Entrepreneurship	2	0	0	2	2
3	EC-311	Electromagnetic Field Theory	3	0	0	3	3
4	EC-312	Linear IC's & Application	3	1	4	8	6
5	EC-313	Digital Communication	3	1	2	6	5
6	EC-314	Electronic Workshop Practice-II	0	0	4	4	2
7	EC-315	Principles of Microwave Engineering	2	1	0	3	3
8	TP-301E	Industrial Training					S/US
Total			15	3	10	28	23
Semester-VI							
S. No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	EC-321	Industrial Electronics	3	1	4	8	6
2	EC-322	Wireless & Mobile Communication	3	0	0	3	3
3	EC-323	Microprocessor & Microcontroller Applications	3	1	2	6	5
4	EC-324	Antenna Wave Propagation	3	0	0	3	3
5	EC-325	Microelectronics	3	0	2	5	4
7	EC-327	Project	0	0	4	4	2

Total		15	2	12	29	23	
Total Theory & Practical Load for Diploma		92	13	76	181	142	
Note:	The required credits for certificate programme					96	
	The required credits for ICD programme					142	
	Maximum courses in one semester					7	
	Maximum Contact Hrs.					32	
	The common courses and their credits are fixed for all ICD programmes.						
Courses offered to other Departments:							
S. No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	EC-211	Fundamental of Electronics Engineering	3	0	2	5	4
2	EC-221	Fundamental of Electronics Engineering	3	0	2	5	4

Assessment rubrics

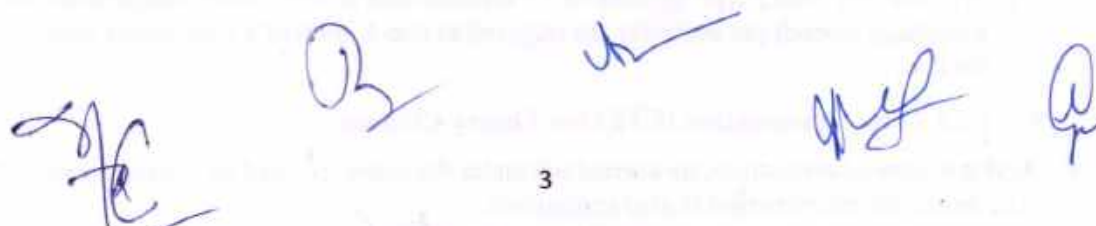
The designed Curriculum have effectiveness, well-structured, Choice based credit system, industry-based syllabus, flexibility, and high theory to practical ratio following outcome based education	10 marks
The designed Curriculum have effectiveness, well-structured, Choice based credit system, industry-based syllabus, flexibility, and high theory to practical ratio	08 marks
The designed Curriculum have effectiveness, well-structured, Choice based credits, industry-based syllabus, and high theory to practical ratio ✓	06 marks
The designed Curriculum have effectiveness, well-structured, Choice based credits and industry-based syllabus	04 marks
The designed Curriculum well-structured, Choice based credits and have effectiveness	02 marks

2. Equivalence and Relevance of curriculum at national level

Department of Electronics and Communication Engineering had prepared a curriculum for ICD program at par with AICTE curriculum with approximately total 142 credit and then approved by Senate. There has been a concern about quality of technical education in India in terms of access and equity. The Government of India has appointed AICTE as nodal agency for planned and coordinated development of Technical Education; regulate proper maintenance of norms & standards and expansion of Technical Education with Quality. The quality of technical education depends on many factors but largely on socially and industrially relevant curriculum, good quality motivated faculty, teaching learning process, effective industry internship and evaluation of students based on desired outcomes. Therefore, AICTE has developed a model curriculum with the help of best experts from academia and industry, in view of the latest industry trends and market requirements in all major diploma in engineering & technology subjects that must be made available to all universities / board of technical education and diploma institutions in the country.

SLIET is also in the process of restructuring the ICD scheme and syllabus to incorporate the AICTE model curriculum.

Remarks: AICTE model curriculum has 120 credits with program open electives. In SLIET there are 142 credits with lacking in choice-based system.



Assessment rubrics

Equivalence and relevance of designed Curriculum with model curriculum $\geq 80-100\%$	10 marks
Equivalence and relevance of designed Curriculum with model curriculum $\geq 60\%$ and $< 80\%$ ✓	08 marks
Equivalence and relevance of designed Curriculum with model curriculum $\geq 40\%$ and $< 60\%$	06 marks
Equivalence and relevance of designed Curriculum with model curriculum $\geq 20\%$ and $< 40\%$	04 marks
Equivalence and relevance of designed Curriculum with model curriculum $< 20\%$	02 marks

3. Formal academic load on students [Teaching, Laboratory/practical, projects (minor/major)]

Academic load is generally measured in terms of credit load and course difficulty. The success of student is generally measured in terms of GPA. The academic load on students per semester is given below:

Semester	Theory (hr)	Tutorial (hr)	Laboratory (hr)	Projects (hr)	Credit Point
1 st	19	1	12	00	26
2 nd	15	1	16	00	24
3 rd	14	3	12	00	22
4 th	14	3	14	00	24
5 th	15	3	10	00	23
6 th	15	2	12	04	23
Total	92	13	76	04	142

Assessment rubrics

Academic load of designed Curriculum with model curriculum $\geq 80-100\%$ ✓	10 marks
Academic load of designed Curriculum with model curriculum $\geq 60\%$ and $< 80\%$	08 marks
Academic load of designed Curriculum with model curriculum $\geq 40\%$ and $< 60\%$	06 marks
Academic load of designed Curriculum with model curriculum $\geq 20\%$ and $< 40\%$	04 marks
Academic load of designed Curriculum with model curriculum $< 20\%$	02 marks

4. Evaluation process (Continuing Evaluation, and End-Term Evaluation)

- Continuous Assessment Examinations (CAE) carrying 50% weightage.
 - End Term Examination (ETE) carrying 50% weightage.
- Continuous Assessment Examination (CAE) in Theory Courses**
 - There are two minor tests (30% weightage) of their average marks. Under extraordinary circumstances, a faculty may take third minor of a particular student.
 - At least one MCQ type quizzes of 15 minutes and at least three assignments with 10% weightage in each per semester are required to check student's continuous involvement in the course.
 - End Term Examination (ETE) for Theory Courses**

End semester examinations are carried out under the supervision of an institute level authority. The venue for examination is also centralized.

The structure of the question paper is as under: -

- (a) The question paper contains three sections.
- (b) Section-I has one compulsory question of short answer type questions covering whole syllabus. Section-II and Section-III contains three questions covering the entire course syllabus and the students need to attempt two questions from each section.
- (c) Students have to attempt five questions in all which carry equal marks, with sufficient weightage given to the numerical type problems, wherever possible.

• **Bonus Marks for Attendance in the classes**

5% weightage is given for attendance as bonus marks over and above the total marks with prior information in starting of course. However, the total marks awarded to the students shall not be more than the maximum marks in a course.

• **Evaluation in Practical courses**

- (a) Continuous Assessment Examinations (CAE) carrying 60% weightage.
- (b) End Term Examination (ETE) carrying 40% weightage.

• **Continuous Assessment Examination (CAE) in Practical Courses.**

- (a) There is continuous assessment of the student in term of practical records, oral viva for each lab, performance during the conduction of experiments etc. all the components have overall 60% weightage in the total marks obtained in practical work.

• **End Term Examination (ETE) for practical Courses**

The End Term Examination is conducted at the end of each semester for each lab course as notified in the Academic Calendar and it is mandatory for a student to appear in it. The examination in laboratory courses includes the write-up for the experiment and its conduction in the concerned laboratory and viva voce. The students must write all the segments of experiment like aim, fundamental theory, flow chart (if any), platform (software, if applicable), experimental procedure, software program (if applicable), observation table, calculation, result and discussion, precautions etc. This component has 50% (out of 40) weightage in the total marks for external evaluation. The remaining 50% (out of 40) are based on oral viva based on experiment performed during the final examination. The faculty may conduct a written true/false statement type test/ lab quiz in place of viva-voce for uniform grading of the students.

The Overall Evaluation (Distribution of Grade)

The award of grade has two components for theory and practical:

- (a) The 50% weightage is given to marks obtained in theory.
- (b) The 50% weightage is given to the marks obtained in practical.

The overall grading is done based on following:

Grade	Range of Marks		No of Candidate
	From	To	
A+	80	100	
A	75	79	
B+	66	74	
B	61	65	
C+	51	60	
C	41	50	
D	30	40	
E	0	29	
F	-	-	
I	-	-	
S			
US			

5

Assessment rubrics

The designed Curriculum have standard and continuous teacher-based assessment grading criteria ✓	10 marks
The designed Curriculum have standard as well as Tutorial, Quiz, Minor and End Term examination -based assessment grading criteria	08 marks
The designed Curriculum have standard and only Minor and End tem examination-based assessment grading criteria	06 marks
The designed Curriculum have standard and only end term examination based assessment grading criteria	04 marks
The designed Curriculum does not have any standard assessment grading criteria	02 marks

5. Tour/Training/Industrial visit/Internship opportunities provided during the year

As per course curriculum, the students must perform two-week practical training (TP-201) after 2nd semester and four-week industrial training (TP-301) after 4th semester. The report is submitted to respective Faculty Coordinator (Summer Training) through the Faculty Mentor/Supervisor (Summer Training) assigned to the student.

The list of students along with respective mentor/supervisor is also available of institute website and enclosed below for kind ready reference.

Assessment rubrics

Admit students attended tour and training/Industrial visits ≥ 80 - 100% of scheduled	07 marks
Admit students attended tour and training/Industrial visits ≥ 60 % and < 80 % of scheduled	05 marks
Admit students attended tour and training/Industrial visits ≥ 40 % and < 60 % of scheduled	03 marks
Admit students attended tour and training/Industrial visits ≥ 20 % and < 40 % of scheduled ✓	02 marks
Admit students attended tour and training/Industrial visits < 20 % of scheduled	01marks
Average Number of tours/class/ year > 1	03 marks
Average Number of tours and industrial visits/class/ year: 0.25-1 ✓	02 marks

Two Week In-house Training of ICD First Year Students (CSME/ CTV-2021) in 2022

Faculty Coordinator: Alka Singla/ Vipul Singhal

i. In-house Training details of ICD/CSME

ICD/CSME Course Schedule	Lab	Date	Technician Coordinator
Design and fabrication of PCB	PCB Lab	5-7 June,2023	Mr. Ravinder Singh and Mr. Gurmit Singh
Troubleshooting of trainers in audio video systems	TV Lab	8-9 June,2023	Vijay Parasher and Suman Kumar
Identification of components and soldering practices	S & M Lab	12-14 June, 2023	Smt. Gurmeet Kaur and Vijay Parasher
Study of measuring instruments and software practices in Multisim	AC Lab	15-16 June 2023	Mr. Amarjit Singh and Mr. Jujhar Singh

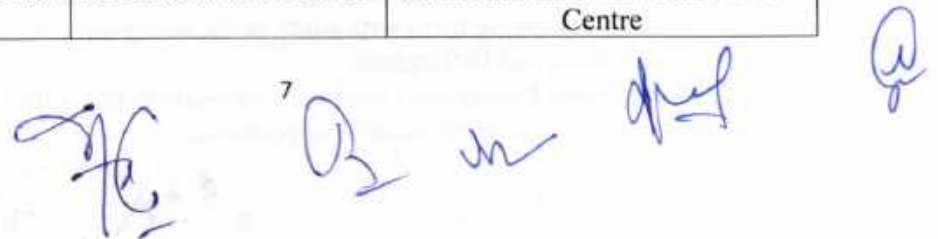
ii. In-house Training details of ICD/ CTV

ICD/CTV Course Schedule	Lab	Date	Technician Coordinator
Identification of components and soldering practices	S & M Lab	5-7 June,2023	Smt. Gurmeet Kaur and Vijay Parasher
Troubleshooting of trainers in audio video systems	TV Lab	8-9 June,2023	Vijay Parasher and Suman Kumar
Design and fabrication of PCB	PCB Lab	12-14 June, 2023	Mr. Ravinder Singh and Mr. Gurmit Singh
Study of measuring instruments and software practices in Multisim	AC Lab	15-16 June 2023	Mr. Amarjit Singh and Mr. Jujhar Singh

Industrial Training of ICD-CSME/CTV-2020 (4 Weeks duration in 2022)

Faculty Training Coordinator (CTV/CSME): Dr. Sarbjeet Singh/ Er. Vivek Harsley

Trade	Reg. No.	Student	Company Name
DEC-CTV	2010361	YASH SHARMA	BSNL
DEC-CTV	2010372	KISHLAY RAJ	Bhart Sanchar Nigam Limited
DEC-CTV	2010363	KRATIKA SHARMA	Think NEXT Technologies Private Limited
DEC-CTV	2010355	ADARSH RANJAN	Bharat Sanchar Nigam Limited
DEC-CTV	2010362	ABHINAV KUMAR	Bharat Sanchar Nigam Limited
DEC-CTV	2010364	SATYAM KUMAR	Bharat Sanchar Nigam Limited
DEC-CTV	2010381	RAJENDRA KAMAL	Bharat Sanchar Nigam Limited
DEC-CTV	2010377	SHUBHANKAR KUMAR	Bharat Sanchar Nigam Limited
DEC-CTV	2010357	ANISHA SINGH	Doordarshan Patna
DEC-CTV	2010352	NIKITA GUPTA	Doordarshan Patna
DEC-CTV	2010353	SMRITI KUMARI	Doordarshan Patna
DEC-CTV	2010373	SANSKAR KAUSHIK	Electricity Urban Distribution Board, UP Power Corporation Limited, Saharanpur
DEC-CTV	2010378	RUPALI KUMARI	BSNL
DEC-CTV	2010356	SNEHA	Bharat Sanchar Nigam Limited
DEC-CTV	2010360	GAURAV KUMAR	BSNL
DEC-CTV	2010380	ADYA ANAND	BSNL
DEC-CTV	2010351	DIVYANSH RAJ	Ansh Infotech
DEC-CTV	2010354	PALAK	THE IT ZONE SONY CENTRE
DEC-CSME	2010406	ANKIT KUMAR	Bharat Sanchar Nigam Limited
DEC-CSME	2010407	GURPREET SINGH	Marahar Power Control Pvt Ltd
DEC-CSME	2010408	GARV ARORA	Sahayak India Nidhi Limited
DEC-CSME	2010410	PRIYAM TIWARI	Angel Institute Of Technology
DEC-CSME	2010411	SAMEER SUMAN	BSNL
DEC-CSME	2010412	AMAN KUMAR	Isgec Heavy Engineering Limited
DEC-CSME	2010413	AAKASH KARNWAL	National Instruments Innovation Centre



DEC-CSME	2010413	AAKASH KARNWAL	Bharat Sanchar Nigam Limited
DEC-CSME	2010415	SHALINI KUMARI	IOCL
DEC-CSME	2010417	ANKIT KUMAR	Bharat Sanchar Nigam Limited
DEC-CSME	2010418	RAJA KUMAR	BSNL Saharsa
DEC-CSME	2010419	ABHAY GOSWAMI	BSNL
DEC-CSME	2010420	SHASHANK SINHA	ITC Limited
DEC-CSME	2010423	ARPAN KUSUM	Bharat Sanchar Nigam Limited
DEC-CSME	2010424	ANANYA PALAK	BSNL
DEC-CSME	2010401	ARYA SHREE	NTPC
DEC-CSME	2010404	ABHISHEK KUMAR	Marahar Power Control Pvt. Ltd
DEC-CSME	2010405	PAYAL KUMARI	BSNL

6. Effectiveness of assisted learning, tutorial system for ICD students/Seminars (refer Course file)

In the academic setup, a course file is essentially a document that includes all the necessary details regarding the batch, assessment, and overall outcomes of the course. Course file generally includes information like the student details, course information, assessment metrics and assignments, Tutorial course outcomes and objectives etc. The following is general table of content of course file maintained by each faculty member.

S. No.	Title
1	Academic Calendar
2	List of registered Students
3	Course Syllabus
4	Timetable and Evaluation Procedure
5	Lecture Plan
6	Minors-I
7	Minors-II
8	Tutorials/Assignments
9	Quiz-I
10	Quiz-II
11	Major End Exam
12	Results Copy

Assessment rubrics

Increased active involvement of weaker students in tutorial classes ✓	02 marks
Improvement in students' analytical capabilities, and soft skills ✓	02 marks
Improvement in communication skills of the students ✓	1 mark
Effectiveness of seminar presentation by the students towards learning ✓	1 mark
Assisted learning system for students in place ✓	02 marks

7. Faculty mentoring/Faculty advisor system for class of students

The institute has different level monitoring system like at department level and at institute level

- At departmental level:

A class counsellor has been appointed to mentor individual class.

Role of class counselor: it is expected from the counsellor to ensure that the student remains disciplined and motivated in class. Moreover, counsellors provided the following for students:

- Academic Guidance:** In helping students understand their learning needs and blocks, such as equipping them with study skills, doing semi-formal assessments for Learning Disabilities and Difficulties.
- Career and Vocational Guidance:** counsellors can guide the students in choosing the right career based on suitable opportunities.

3. *Psychosocial Problems*: A counsellor helps in early identification of problem behaviours and takes suitable steps to prevent the onset of psychosocial problems. In case of psychosocial problems detected after their onset, the counsellor works towards finding suitable solutions, or due to the time constraints in college, looks at referring the child to a more suitable setting if the child's home environment allows for it.
 4. *Working with Parents*: To enable holistic support and to ensure that the student's home environment is secure and nurturing for her, as well as to keep the parents in the loop about the work done in counselling, and how to ensure that the results are maintained at home.
 5. *Working with Teachers*: Teacher meetings are extremely crucial to ensure two basic things
 - i. To keep the teacher in the loop about the work being done, and how to modify his/her behaviour accordingly, as well as for inputs about the conditions of the classroom.
 - ii. Help the teacher manage his own workload, by providing them with skills such as coping skills or problem-solving strategies or emotional unburdening.
 6. *Working with School Administration*: working as bridge in between student's and administration.
- At Institute level:
 1. *Student-Mentor scheme*: The senior student has been appointed to mentoring the junior students.
 2. *Tutor-Guardian scheme*: A teacher has been appointed as a guardian to look forward all the academic activities as well as mentoring of four to five student of each class.
 3. *Warden*: A hostel warden is also mentoring the students.

Assessment rubrics

Faculty mentoring/faculty adviser are available to admitted students >91% ✓	10 marks
Faculty mentoring/faculty adviser are available to admitted students >81 and <90%	08 marks
Faculty mentoring/faculty adviser are available to admitted students >71 and <80%	06 marks
Faculty mentoring/faculty adviser are available to admitted students >61 and <70%	04 marks
Faculty mentoring/faculty adviser are available to admitted students >51 and <60	02 marks

8. Practical activities, non-academic and totally related to a specific trade for skill development and developing expertise in a particular group of techniques.

For providing the professional platform to students of undergraduate program of the department to learn, boost and exercise their potential through various activities, following Professional Societies/ Students' Chapters have been established at Department of Chemical Engineering, SLIET:

S. No.	Name of the Society/ Club	Faculty Coordinator/ Advisor (Present)
1	Sky liners, skating Club	Er. Kuldip Singh
2	Persona SLIET	Dr. G K Jawa /Er. Kuldip Singh
3	Electronics society	Dr. Sarbjeet Singh

In addition to above mentioned activities by various clubs/ students' chapters of societies on regular basis, following major activities have been conducted by department during last three years:

Expert Talks:

Name of Faculty/ Designation	Organisation/ Institute	Date	Field of Talk
Dr. J S Ubhi Professor (ECE)	Department of Electronics & Communication Engg., SLIET Longowal.	13 -24 February, 2023	Hands on practice on Cadence Tools

Prof H S Jatana, Hub Centre, PGI Chandigarh	Department of Electronics & Communication Engg., SLIET Longowal.	24 January, 2023	"Recent Trends in Semiconductors and Electronics"
Dr. Anupma Marwaha Professor (ECE)	SLIET Longowal	December 06-11, 2021	Recent Trends of Microwave and Photonics Technology: 5G and Beyond
Dr. J S Ubhi Professor (ECE)	Institution of Engineers (India), Bathinda	December 04-05, 2021	5G: The Catalyst to Digital Revolution
Dr. Anupma Marwaha Professor (ECE)	Guru Jambheshwar University of Science and Technology, Hisar	August 20-24, 2021	An Insight into Numerical Techniques for EM Design
Dr. Anupma Marwaha Professor (ECE)	Indo Global College of Engineering, New Chandigarh	7 June 2021 to 12 June 2021	Nanomaterial Based Applications for Smart Electronics
Dr. Anupma Marwaha Professor (ECE)	KLS Gogte Institute of Technology, Belagavi, Karnataka, India	12 January, 2021	Computational Electromagnetics
Dr. Dilip Kumar, Professor (ECE)	Giani Jail Singh Campus, College of Engg. and Technology, MRSPTU, Bathinda, Punjab	17 February, 2021	"Design and Development of IOT based Real Time Monitoring System"
Dr. Kundan Kumar, Assistant Professor (ECE)	School of Electronics Engineering, VIT, Vellore (India)	18 January, 2021	"Recent trends on Microwave and Photonics"
Dr. Kundan Kumar, Assistant Professor (ECE)	IEEE HMRITM Student Branch, New Delhi (India)	22 March 2021- 26 March 2021	"Emerging Technologies in the Field of RF and IoT"
Dr. Kundan Kumar, Assistant Professor (ECE)	Meerut Institute of Engineering & Technology (MIET), Meerut (India)	05-December-2020	"Future Research on Mobile Handset and its Components"

Workshops/ Seminars/ Mega Events Organized:

S. No.	Name of the Program	Dates	Coordinators/ Agency	No. of students/ participants
1	Short-term course on "Recent Trends in Wireless Communication"	20 -24, July, 2020	TEQIP-III sponsored	100(Approx.)
2	STTP on "Intelligent Systems & Networks (ISN-2020)"	31/08/2020 to 04/09/2020	TEQIP-III sponsored	41
3	Short term course on "Recent Trends in Electronics and Communication Engineering (RTECE-2020)"	20-25, Dec.,2020	QIP sponsored	70
4	Short-term course on "Computational	September 28 to October3, 2020	QIP sponsored	130

	Techniques in Image and Signal Processing”			
5	Three-day online workshop on, “Cloud Based Simulation Practices for Advanced Virtual Labs using My TaraNG”	07/02/21,13/02/21 and 14/02/21	Er. Swapnil Narhari Gaul, Founder and Director, NUMEREGION and Er. Madhura Barshikar, Application Engineer, NUMEREGION, Delhi	80
6	5-Days ATAL FDP program on "Recent Trends in Precision Agriculture "	31st May 2021 to 4th June 2021	AICTE sponsored	147
7	Six Weeks Online Summer Internship Program on “Recent Trends in RF Technology (Simulation and Fabrication)”	June 21-July 30, 2021	Dr. Kundan Kumar and Dr. Alka Singla	137
8	Online Short-Term Course on “Recent Trends of Microwave and Photonics Technology: 5 G and Beyond”	December 06 - December 11, 2021	Er. Vipul Singhal and Dr. Kundan Kumar	50
9	Two-day online workshop on “Scientific Writing Using LaTeX”	March 14-15,2022	Er. Vipul Singhal and Dr. Ashwani Aggarwal	39
10	Four week Industrial Training on “Advance Communication Technologies”	July 01-28, 2022	Er. Vipul Singhal and Dr. Kundan Kumar	51
11	ATAL FDP on “Current Avenues in Communication and VLSI Design”	February 13-24, 2023	Dr. J.S. Ubhi	40

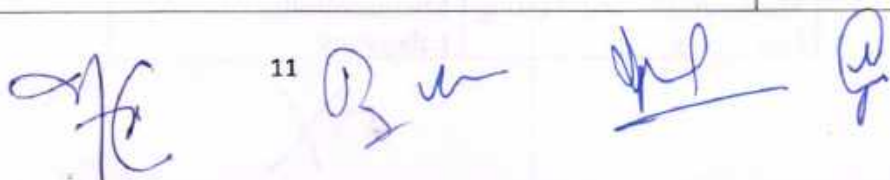
Publication of technical magazines, newsletters etc.

Name of Magazine/ Newsletter	Frequency	Faculty Coordinator/ Editor
SVIESA-THE PMC SLIET		Prof. Ajaypal Singh
ANSHUMAT (Newsletter of SLIET)	Quarterly	Dr. Sanjiv Garg
SRIJAN (Annual Magazine of SLIET)	Annual	Dr. Sanjiv Garg

Assessment rubrics

Students attended any practical, non-academic activity related to skill development >80%	10 marks
Students attended any practical, non-academic activity related to skill development ≥60% and <80% ✓	08 marks
Students attended any practical, non-academic activity related to skill development ≥40% and <60%	06 marks
Students attended any practical, non-academic activity related to skill development ≥20% and <40%	04 marks
Students attended any practical, non-academic activity related to skill development <20%	02 marks

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9. Linkage of ICD program to outcome based vocational education (industry linkage)

It aims to provide the diversified of educational opportunities so as to enhance individual's employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education.

Total Project hour load = 80 hrs

Total ICD load= 185 hours

Hands on training load/ total ICD load=80/185 = 43% + Industrial training

Assessment rubrics

Hands on training load (Practical+Project+industrial training)/ total ICD load, ≥75%	10 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, ≥60% and <75%	08 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, ≥50% and <60% ✓	06 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, ≥40% and <50%	04 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, <40%	02 marks

10. Availability of workshop type lab/laboratory for providing hand on training to the students for skill development

Skills development in students is essential to face the challenges of everyday life. There is a dramatic change in the world due to the unprecedented use of technology during the past few decades. These transformations impact all spheres of our life including education, economy, career, etc. To cope up with the increasing pace and changes, students should learn the necessary skills to make sure of their desired career. They must be able to deal with competition in the job market. Only those who have Technical Skills and soft skills will be stand out from the crowd. Technical Skills in Career will Generate High-Income while Soft Skills Provide Greater Career Prospects. Keeping view of aforementioned facts, the following facilities have been developed for providing hand on training to the student for skill development.

Central Workshop: The Central Workshop is established at Sant Longowal Institute of Engineering & Technology (Deemed to be University), Longowal to impart the practical training to the students of all the branches. The various shops of Workshop are fully equipped and provide centralized training to Certificate and Diploma students. It also caters the need of the project work of the students.

Different types of workshops

- a) Machine Shop b) Tool Room c) Arc Welding Shop d) Sheet Metal Shop
 e) Gas Welding Shop f) Pattern Shop g) Carpentry Shop h) Fitting Shop
 i) Foundry Shop j) Forging Shop

Departmental Laboratory: The departmental laboratory has been developed for hands out training of students. The following laboratory are well equipped with different equipment.

Printed Circuit Board Laboratory	Basic Electronics Laboratory	Servicing & Maintenance/Industrial Electronics Laboratory
Television Engineering Laboratory	ICD Project Lab	Computer Laboratory
Electromagnetic Measurement and Testing Lab	Microprocessor & Microcontroller Laboratory	Microwave Engineering Laboratory

Assessment rubrics

The workshop/lab can provide hands-on training for skill development >80%	10 marks
The workshop/lab can provide hands-on training for skill development $\geq 60\%$ and <80%	08 marks
The workshop/lab can provide hands-on training for skill development $\geq 40\%$ and <60%	06 marks
The workshop/lab can provide hands-on training for skill development $\geq 20\%$ and <40%	04 marks
The workshop/lab can provide hands-on training for skill development <20%	02 marks

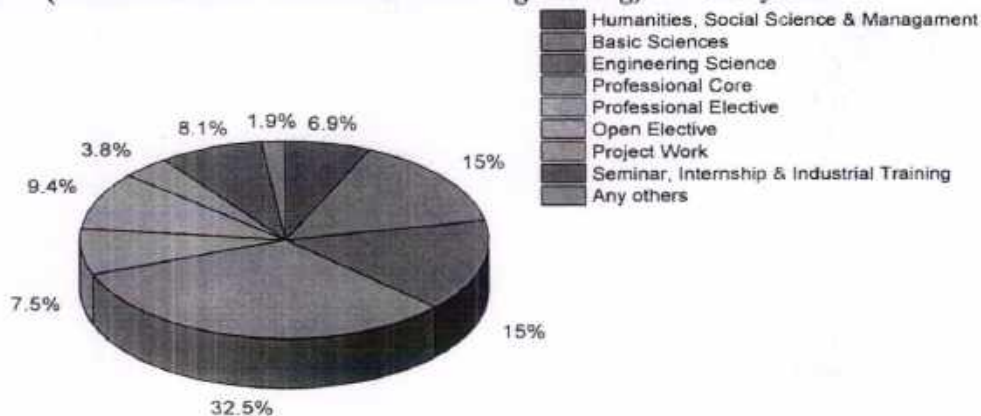
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A.2 UG programme

1. Curriculum (Structure, Course Syllabi, Flexibility)

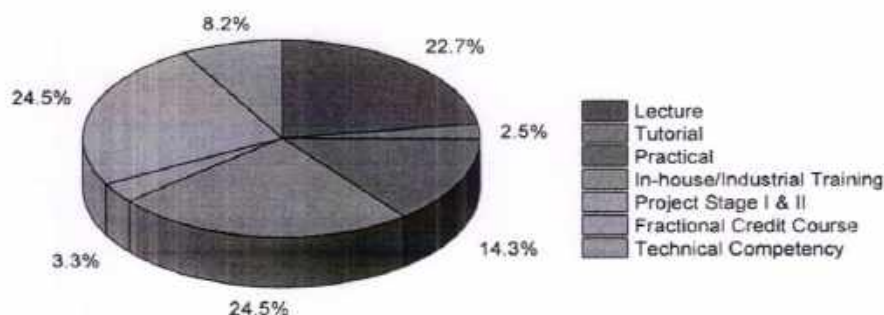
The UG curriculum is created by members of the Board of Studies (BOS) at the department level and approved by the institute's Senate. The BOS periodically revises its curriculum based on input from many stakeholders, including students, academics teaching and researching the discipline, and industry professionals offering new and industrially relevant subjects. The necessary curriculum modifications are considered and approved by the Senate.

A) B. E. (Electronics and Communication Engineering) Credit System



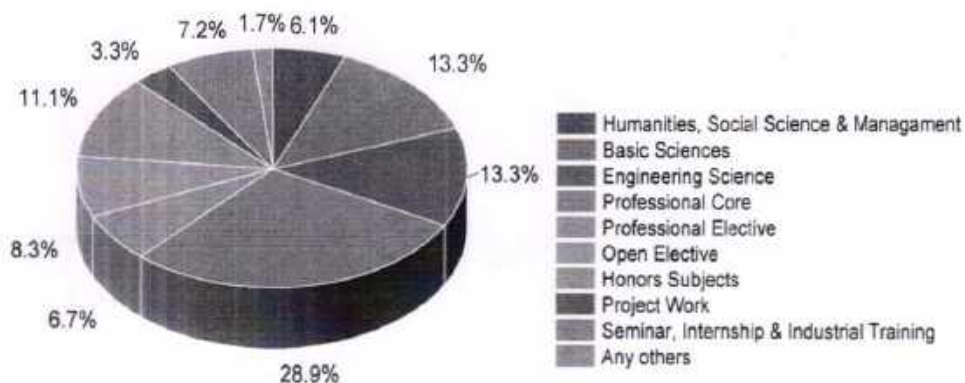
Bachelor of Engineering (ECE) Credit System

B) B. E. (Electronics and Communication Engineering) Hourly distribution of lecture, tutorial, practical, etc.



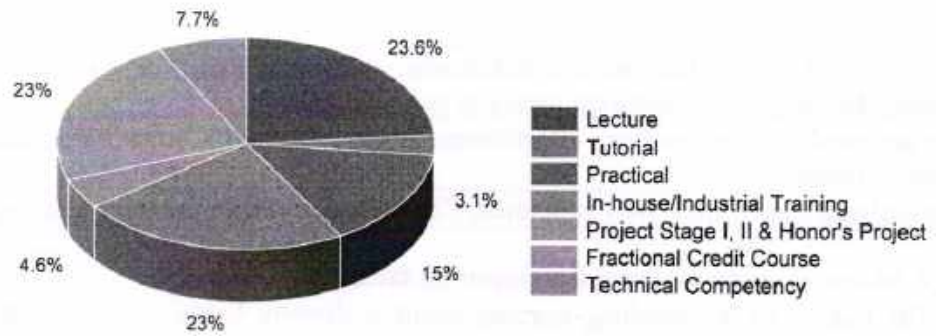
B.E. (ECE) Programme Hourly Distribution

C) B. E. Electronics and Communication Engineering (Honor's Degree) Credit System



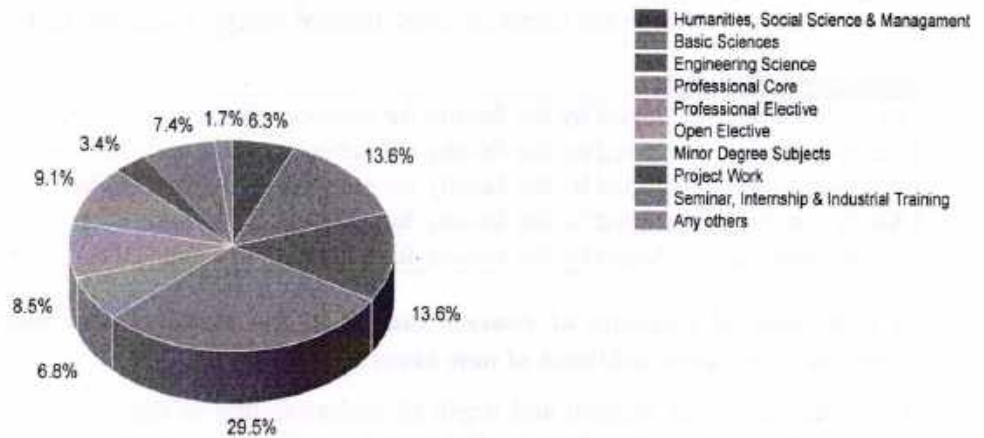
Bachelor of Engineering (ECE) Honors Degree Credit Score

D) B. E. Electronics and Communication Engineering (Honor's Degree) Hourly distribution of lecture, tutorial, practical, etc.



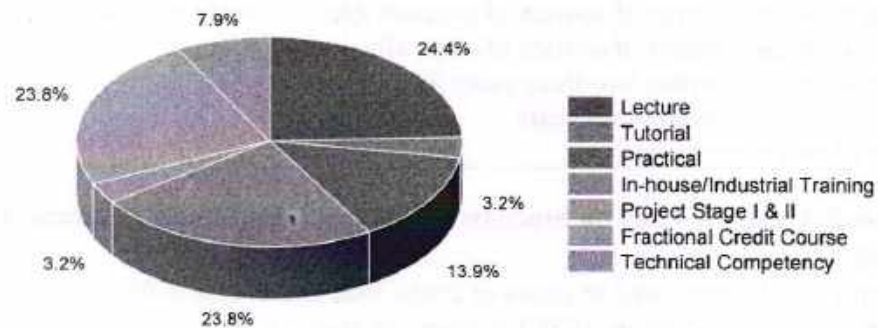
B.E. Electronics and Communication Engineering (Honor's Degree) Hourly Distribution

E) B. E. Electronics and Communication Engineering (Minor Degree) Credit System



B.E. Electronics & Communication Engineering (Minor Degree) Credit Score

F) B. E. Electronics and Communication Engineering (Minor Degree) Hourly distribution of lecture, tutorial, practical, etc



B.E. Electronics and Communication Engineering (Minor Degree) Hourly Distribution

G) Assessment Rubrics

The designed Curriculum have effectiveness, well-structured, Choice based credit system, industry-based syllabus, flexibility, and high theory to practical ratio following outcome-based education ✓	10 marks
The designed Curriculum have effectiveness, well-structured, Choice based credit system, industry-based syllabus, flexibility, and high theory to practical ratio	08 marks

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The designed Curriculum have effectiveness, well-structured, Choice based credits, industry-based syllabus, and high theory to practical ratio	06 marks
The designed Curriculum have effectiveness, well-structured, Choice based credits and industry-based syllabus	04 marks
The designed Curriculum well-structured, Choice based credits and have effectiveness	02 marks

2. Status of study material developed by faculty for students

The quality of the teaching-learning result is directly linked. The development of teaching-learning materials is regarded as one of the major aspects that would promote student learning and help in the achievement of academic goals and objectives. Following types of study material developed by the faculty of the ECE department from time to time.

- Video lectures developed by faculty for the students.
- Study material in the forms of notes, tutorial sheets, assignments, etc.

Assessment Rubrics

Study material developed by the faculty for subjects >80% and <100%	10 marks
Study material developed by the faculty for subjects >60% and <80% ✓	08 marks
Study material developed by the faculty for subjects >40% and <60%	06 marks
Study material developed by the faculty for subjects >20% and <40%	04 marks
Study material developed by the faculty for subjects >5% and <20%	02 marks

3. Relevance of contents of courses taught to the students and scope of improvement (revision of syllabus, addition of new experiments)

The syllabus fosters breadth and depth of understanding in the subject area. The revision of the curriculum/syllabus according to the needs, to eliminate unnecessary units and contents, and introduce the latest and updated content, new knowledge & and practices is necessarily required. The Board of Studies (BoS) are conducted from time to time to improve the syllabus and add new topics by incorporating feedback from industries and academicians. Honours degree and Minor degree courses have been introduced during 2021-22 academic year.

Assessment Rubrics

Adequate relevant contents of courses of program specific taught to students	10 marks
Adequate relevant contents of courses of other allied subjects taught to students ✓	08 marks
Revision of syllabus within two-three years ✓	06 marks
Revision of syllabus within four years	04 marks
Addition of new experiments	02 marks

4. Formal Academic Load on Students [Teaching, Laboratory/ Practical, Projects (minor/major)]

Academic load is measured in terms of credit load and course difficulty. The evaluation of the student is measured in terms of SGPA based on grades in individual subjects in a semester. The academic load on a student per semester is given below:

Credit Structure of Undergraduate Engineering Program							
S.No.	Category	L	T	P	Hrs.	Credits	%age of total
1	Basic Science courses	17	4	6	27	24	15
2	Engineering Science	12	3	18	33	24	15
3	Humanities and Social Sciences	9	0	4	13	11	6.87
4	Program Core courses	34	5	26	65	52	32.5
5	Program Elective	12	0	0	12	12	7.50
6	Open Electives	15	0	0	15	15	9.37

7	Project	0	0	0	12	6	3.75
8	Internship/Seminar/Industrial Training	0	0	0	204	13	8.125
9	Any other (Mandatory courses and fractional credit courses)	6	0	0	120	126	1.875
Total number of Credits						160	

Assessment Rubrics

Adequacy of formal academic load on students (teaching/Laboratory/practical) ✓	10 marks
Adequacy of formal academic load on students (minor/major projects)	08 marks
Adequacy of formal academic load on students (minor/major projects)	06 marks
Flexibility to extend course duration in limited, exceptional circumstances	04 marks
Flexibility for opting the academic load for the odd semester/ even Semester/ Summer term/ Distance Session	02 marks

5. Modern teaching methods in practice other than the conventional methods (Course materials, PPT, videos have been developed by the faculty for the students)

E-Assisted Learning

- (i) **Availability of Library Resources**
- (ii) **Multi-Media Assisted Teaching**

Course materials, PPTs, videos, library sources, and multi-media assisted teaching help to explain the concepts in a lucid manner to the students. In addition, it creates the learning environment more interactive and allows the integration of various technologies to improve the learning experience.

- Central library provides the e-resources to the students like e-books, e-journals, open access resources, online video lectures by the prominent academicians.
- Faculty of the ECE department also follow ICT tools to the students for the effective multimedia assisted teaching.
- Faculty members also developed video lectures in their specialized area for the students. Also, these video lectures are uploaded on SLIET website.

Assessment Rubrics

Course Materials, videos and PPT developed by the faculty ✓	10 marks
Course Materials PPT developed by the faculty	08 marks
Library sources made available to students from other sources related to course	06 marks
Multimedia assisted teaching >65% and <100%	04 marks
Multimedia assisted teaching >15% and < 65%	02 marks

6. Evaluation Process (Continuing Evaluation, and End-Term Evaluation)

The students are continuously assessed to ensure that the programme content is adequate. Students' tutorials, class assignments, and laboratory work are often assessed. Seminars, industrial training viva-voce, quizzes, assignments, midterm, and final examinations evaluate student performance. Minor project work is assessed in the 7th semester, followed by major project work in the next semester. This is followed by a Comprehensive and General Proficiency assessment (Viva-Voce).

Question papers are set in accordance to meet largely the program's COs, POs, and PSOs. Due weightage in terms of marks as well as course content of the subjects is given to each exam. The concerned teacher formulates assignments to strengthen their domain knowledge and application to complex engineering problems. The nature of the assignments drives the students to use advanced techniques, including software tools for prediction and modelling and referring to additional sources of information. These are evaluated and discussed with the students to iron out their deficiencies.

a) Theory and tutorial

The evaluation of students' performance is a continuous process based on their performances in different examinations/tests as Continuous Assessment Examinations (CAE) and End Term Examination (ETE). The total marks for each course (Theory and Practical) will be 100, each comprising two components as given below:

A. Continuous Assessment Marks (CAM) - 50 Marks

B. End Semester Exam Marks (ESM) - 50 Marks

Pattern for Internal examination (CAM)				
S. No.	Components for CAM	Syllabus Coverage for the test	Duration of the test in Hrs.	Marks (max.)
1	Minor Test - I	First 30 to 40 % of the syllabus	1	30 (equal weightage for two tests)
2	Minor Test - II	Next 30 to 40% of the syllabus	1	
3	Quiz	At least two quizzes are to be conducted	0.5	10
4	Assignment			10
	Total			50
Pattern for end semester examination (ESM)				
S. No.	Exam	Syllabus Coverage the test	Duration of the test in Hrs.	Marks (max.)
1	End Semester Exam	Full Syllabus	3	50
2	Attendance			5 (max.)

b) Practical (case studies)

Every practical exercise/experiment in all practical courses will be evaluated based on the conduct of exercise/experiment and records maintained by the students. There will be one model practical examination. The criteria for awarding marks for internal assessment are given in the following table:

Items	Marks (Maximum)
Continuous assessment	50
Model practical exams	50
Total	100
Continuous assessment norms (for each exercise/experiment):	
1.Preparation	10 to 20%
2.Conduct of the exercise/experiment	20 to 30%
3.Observations made (data collection)	10 to 30%
4.Calculations, inferences, result	10 to 30%
5. Viva-voce	10 to 20%
Total	100

Assessment Rubrics

Question papers and Project work are aligned with the COs, POs and PSOs of the program ✓	10 marks
Routine assessment is carried out for tutorials, class assignments (> 6 and <= 10) and laboratory work assigned (>8 and <= 10)	08 marks
Routine assessment is carried out for tutorials, class assignments (> 4 and <= 6) and laboratory work assigned (> 6 and <= 8) ✓	06 marks
Routine assessment is carried out for tutorials, class assignments (> 2 and <= 4) and laboratory work assigned (> 4 and <= 6)	04 marks
Routine assessment is carried out for tutorials, class assignments (<= 2) and laboratory work assigned (<=4)	02 marks

7. Faculty–Student Interaction (Whether any slot is fixed for the students to interact with a teacher, after classes/labs

This faculty-student interaction helps to understand the problems faced by the students during the teaching-learning process and gain insight to strengthen it further. The slot is fixed for the students to interact with a teacher after classes/labs for

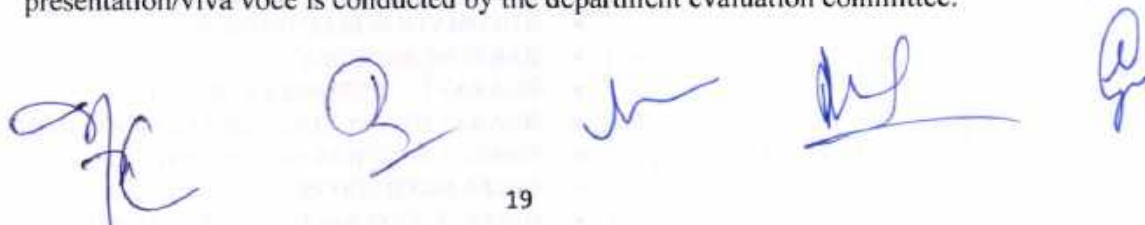
- Class counsellor-student meeting (one hour in a week)
- Course counsellor-student meeting (one hour in a week)
- Training coordinator-student meeting (one hour in a week)
- Meeting in the respective hostels (one hour per day)

Assessment Rubrics

Average Faculty–Student interaction per week after classes/ Labs>10	10 marks
Average Faculty–Student interaction per week after classes/labs >8 and <=10 ✓	08 marks
Average Faculty–Student interaction per week after classes/labs >6 and <=8	06 marks
Average Faculty–Student interaction per week after classes/labs >4 and <=6	04 marks
Average Faculty–Student interaction per week after classes/labs >2 and <=4	02 marks

8. Tour/Training/Industrial visits/Internship opportunities

- The department of ECE has constantly worked to provide industry tours/internships/summer training to students to gain practical experience and professionalism. There are two training modules for UG students.
 - First module is of in-house training after completion of 1st years which gives them the motivation to become ready for the engineering journey.
 - In the second module, two industrial training of 2-weeks and 4-weeks after 2nd and 4th year completion respectively. Internships in various industries/organizations are encouraged during semester vacations. Training coordinators, class counsellors, and student-tutor guardians help students arrange industrial internships. Alumni members of the department also assist greatly.
- The department organizes educational visits to important sectors to help students comprehend real-world issues, get practical experience, and inspire them to analyse and bridge the gap between academia and industry.
- There is a provision for six month internship in the 8th semester or to attend classes in last semester. Students of ECE department have undergone six month industrial internship and have completed project work in the respective industry. Evaluation of the students going through training is made by the industry as well as at the institute. Students are required to prepare and submit a 'Daily Diary' and 'Industry Training Report', and a presentation/viva voce is conducted by the department evaluation committee.



- **List of industries where students undergo their training/internship are as given in table.**

Sr. No.	Academic Years	Name of industries
1.	2021-22	<ul style="list-style-type: none"> • AIRPORT AUTHORITY OF INDIA • ALL INDIA RADIO DARBHANGA, JAGDALPUR • APPWARS TECHNOLOGIES PRIVATE LIMITED • ASPIREVISION TECH EDUCATION PVT LTD • BHARAT HEAVY ELECTRICALS LIMITED BHOPAL • BIHAR STATE POWER TRANSMISSION COMPANY LIMITED • BSNL • CETPA INFOTECH PVT LTD • CODE GARAGE TECH • DEFENCE RESEARCH AND DEVELOPMENT ORGANIZATION • DRISH INFOTECH LTD • DRM SONPUR • HARISH CHANDRA RESEARCH INSTITUTE • INDIAN INSTITUTE OF TECHNOLOGY BHUBANESWAR • INDIAN INSTITUTE OF TECHNOLOGY ROORKEE • INFOWIZ • INSTITUTE OF AERONAUTICS AND ENGINEERING BHOPAL • JAYPRAKASH NARAYAN AIRPORT • MARUTI SUZUKI INDIA LIMITED • NARAYANA TECHNOLOGIES • NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY PATNA • NIELET • NORTH CENTRAL RAILWAY • NTPC • ONLEI TECHNOLOGIES • OTIS WORLD WIDE • PYROTECH ELECTRONICS PVT LTD • RATHI STEEL AND POWER LTD • RESEARCH CENTRE IMARAT DRDO • S S SYSTEMS PVT LTD • SHASHIB FLYING ACADEMY AT GUNA AIRPORT • SIGNIMUS TECHNOLOGIES PRIVATE LIMITED • SOFCON INDIA PRIVATE LIMITED • SOLID STATE PHYSICS LABORATORY • THINKNEXT TECHNOLOGIES
2.	2020-21	<ul style="list-style-type: none"> • IIIT NAYARAIPUR • AGM OP BSNL OFFICE • ANSH INFOTECH • ASPIREVISION TECH EDUCATION • ASPIREVISION TECH EDUCATION PVT LTD • AUTOMATION ELECTRONICS • BARAUNI REFINERY • BHARAT ELECTRONICS LIMITED • BHARAT HEAVY ELECTRICALS LIMITED BHEL • BHARAT SANCHAR NIGAM LIMITED • CETPA INFOTECH PRIVATE LIMITED • DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION

		<ul style="list-style-type: none"> • DELHI METRO RAIL CORPORATION LIMITED • DOORDARSHAN KENDRA • ENGINEER CORE IN ASSOCIATION WITH EFFERVESCENCE IIIT ALLAHABAD • HDLC TECHNOLOGIES • IATC SIEMENS • INDIAN OIL CORPORATION LTD BARAUNI REFINERY • INDRAPRASTHA POWER GENERATION CORPORATION LIMITED • INFOVUE SOLUTIONS • IOCL • IOTTECH SMART PRODUCTS • NATIONAL ALUMINUM COMPANY LTD • NATIONAL FERTILIZERS LIMITED • NATIONAL INSTITUTE OF ELECTRONIC AND INFORMATION TECHNOLOGY GORAKHPUR • NHPC LIMITED • NIELIT • NISCOM TELE INFRA PVT LTD • NORTH BIHAR POWER DISTRIBUTION COMPANY LIMITED NBPDC • NTPC LIMITED • OHM STARTUPS • ONGC DEENDAYAL URJA BHAWAN • RAD TECHPRO SERVICES PRIVATE LIMITED • S A AUTOMATION PRIVATE LIMITED • SAHASRA ELECTRONICS • SBPDCL • SELDOM INDIA TECHNOLOGIES JAIPUR • SLIET • SOFCON INDIA PVT LIMITED • SOUTH BIHAR POWER DISTRIBUTION COMPANY LIMITED • SYMS CONSTRUCTION • TAKSATI INNOVATIONS • TATA STEEL • TATA STEEL DOWNSTREAM PRODUCTS LIMITED • TCIL IT • TEKNAVIGATORS • TENUGHAT THERMAL POWER STATION • THINKNEXT TECHNOLOGIES • TRIDENT GROUP • U R RAO SATELLITE CENTRE • VARDHMAN TEXTILES LIMITED • WC RAILWAYS
3.	2019-20	<ul style="list-style-type: none"> • ANTESO BIOMEDICAL OPC PVT LTD • AEGEUS TECHNOLOGIES PRIVATE LIMITED • ANTESO BIOMEDICAL OPC PVT LTD • AZSM ENTERPRISES • BHARAT ELECTRONICS LIMITED • CAPGEMINI • CENTRAL SCIENTIFIC INSTRUMENTS ORGANISATION CSIO • COGNIZANT TECHNOLOGY SOLUTIONS INDIA PVT LTD • CORIZO • CRAW SECURITY • CSIR CSIO

	<ul style="list-style-type: none"> • CSK TECHNOLOGIES • DEFENCE ELECTRONICS AND APPLICATION LABORATORY • DEFENCE RESEARCH AND DEVELOPMENT ORGANIZATION • DIXON TECHNOLOGIES INDIA LIMITED • EDGENRE INFOTECH PVT LTD • EXPERT INTERNATIONAL • EXTECH DIGITAL • FORTUNEPLUS IT NETWORKS PVT LTD • GICT • GIS CONSULTING • HANGINGPANDA PVT LTD • IHUB AWADH IIT ROPAR • INSPECT SMART • INVERTED ENERGY PRIVATE LIMITED • JAI SANTOSHI INFOSYSTEMS PRIVATE LIMITED • JEF MEDISYS PVT LTD • KAILTECH TEST AND RESEARCH CENTRE PVT LTD • LUE INFOSERVICES PVT LTD • MWIDM • NINTYONE SQUAREFEE • RADICO KHAITAN LIMITED • SCIENTECH TECHNOLOGIES PVT LTD • SOLID STATE PHYSICS LABORATORY • SPACE APPLICATION CENTRE ISRO • TECHTALISMAN ENGINEERING PVT LTD • TELECOMMUNICATION ENGINEERING CENTRE • VALLEY ELECTROVISION PRIVATE LIMITED • VRD CREATIVE OPC PVT LTD • WEBSOLGURU • WIKIMEDIA
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Details of students undergone internship in academic year 2022-23

S.NO.	TRADE	REGN.NO.	NAME OF STUDENT
1	GEC	1940319	AAYUSH KARTIK
2	GEC	1940425	VAIBHAV SHARMA
3	GEC	1940432	PRIYANKA KUMARI
4	GEC	1940433	MEHAKJOT SINGH
5	GEC	1940439	SATVIK RAJ PATEL
6	GEC	1940440	OM PRAKASH
7	GEC	1940450	SATYAM JHA
8	GEC	2030156	AJIT KUMAR
9	GEC	2030160	NAVISHA
10	GEC	2030166	ASHISH THAKUR
11	GEC	2030167	RICHIKA RANA
12	GEC	2030168	RISHU TOMAR
13	GEC	2030169	SAURABH KUMAR
14	GEC	2030173	DANYAL WAHAB
15	GEC	2030175	AYUSH KUMAR
16	GEC	2030176	MD SALAM ANSARI
17	GEC	2030558	PULKIT KUMAR
18	GEC	2030559	PURU JAISWAL
19	GEC	2030560	PUSHPANJALI KUMARI
20	GEC	2030561	SAKSHI BHARTI

21	GEC	2030564	AMRIT RAJ
22	GEC	2030568	ANMOL KARNWAL
23	GEC	2030569	RISHAV KUMAR
24	GEC	2030570	KUMAR SAURAV
25	GEC	2030574	SUSHANT RAJ
26	GEC	2030575	VIVEK KUMAR SINGH
27	GEC	2030576	MEHAK
28	GEC	2030579	ROHIT BANSAL
29	GEC	2030581	SHIVAM ANAND
30	GEC	2030587	DEEPAK BELWAL

Assessment Rubrics

Average Number of tours and industrial visits/class/year > 2 and internships	10 marks
Average Number of tours and industrial visits/class/year >1 to <=2 and internships	08 marks
Average Number of tours and industrial visits/class/year >1 to <=2	06 marks
Average Number of tours and industrial visits/class/year >0.25 <=1 and internships ✓	04 marks
Average Number of tours and industrial visits/class/year >0.25 to <=1	02 marks

9. a) Effectiveness of Assisted Learning in Tutorial classes/seminar for students.

b) Faculty Mentoring/ Faculty Advisor System for Students/ Class of Students

- There are tutorial classes for some core subjects where tutorial sheets are provided for practice of variety of questions. In such types of classes, special attention is given to the weaker students to perform well in respective subject.
- Faculty mentors are assigned to the students on UG programme. Faculty mentors provide a reliable and comprehensive support system to motivate students to excel in both academic and non-academic fields and to maintain discipline within the students. Also enabling constructive interaction, guidance, and mentorship for students.

Assessment Rubrics

Increased active involvement of weaker students in tutorial classes ✓	10 marks
Improvement in students' analytical capabilities, and soft skills	08 marks
Improvement in communication skills of the students ✓	06 marks
Effectiveness of seminar presentation by the students towards learning	04 marks
Faculty mentoring/Faculty advisory system for students in place	02 marks

10. Placement %age/higher studies option (last three years)

Number of students placed in 2020-21 are 57/58

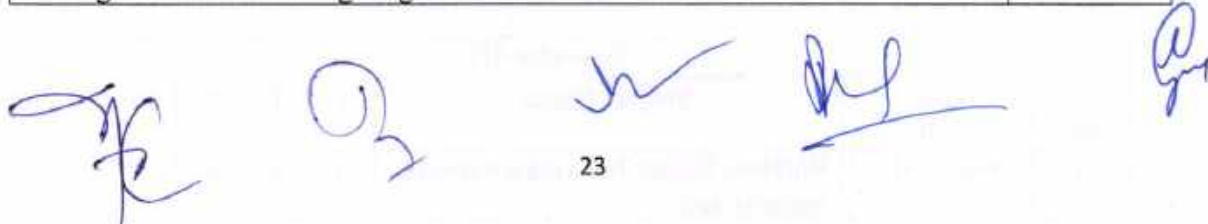
Number of students placed in 2021-22 are 39/61

Number of students placed in 2022-23 are 33/66

Average number of student placement = 70.66 %

Assessment Rubrics

Average of Placement %age/higher studies >80%	10 marks
Average of Placement %age/higher studies ≥60% and <80% ✓	08 marks
Average of Placement %age/higher studies ≥40% and <60%	06 marks
Average of Placement %age/higher studies ≥20% and <40%	04 marks
Average of Placement %age/higher studies <20%	02 marks



A.3 PG programme

1. Curriculum (Structure, Course Syllabi, Flexibility)

M.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

Semester-I							
Sr. No.	Subject Code	Subject Name	L	T	P	Hrs.	Credits
1	PCEC 811	Optical Communication Systems	3	0	0	3	3
2	PCEC 812	Advanced Communication Systems	3	0	0	3	3
3	PEEC 811	Micro & Nano-photonics / RF Circuit Design/ Statistical Information Processing	3	0	0	3	3
4	PEEC 812	Antenna and Radiating System /Internet of Things/ Remote Sensing	3	0	0	3	3
6	RMAL-811	Research Methodology and IPR	2	0	0	2	2
7	ACMH-811	English Research Paper Writing and Professional Communication	2	0	0	2	0
8	PCEC 813	Optical Communication Lab	0	0	4	4	2
9	PEEC 813	Core Elective Lab -I	0	0	4	4	2
Total			16	0	8	24	18

Semester-II (A)							
Sr. No.	Subject Code	Subject Name	L	T	P	Hrs.	Credits
1	PCEC 821	Microwave Integrated Circuits	3	1	0	4	4
2	PCEC 822	VLSI Design	3	0	0	3	3
3	PEEC 821	Advanced Digital Signal Processing / Soft Computing /Digital Image Processing/ Artificial Intelligence and Deep Learning	3	0	0	3	3
4	PEEC 822	Electronic Product Design /Satellite Communication/ Digital Circuit Logic Design	3	0	0	3	3
5	ACMH-821	Constitution of India	2	0	0	2	0
6	PCEC 823	VLSI Design Lab	0	0	4	4	2
7	PEEC 823	Core Elective Lab -2	0	0	4	4	2
8	PCEC 824	Seminar	0	0	2	2	1
Total			14	1	10	25	18

Semester-II (B)							
		Four weeks training in reputed industry/laboratory in Institutions of repute such as IITs, NITs, CSIR, DRDO, CSIO etc.				40	S/US

Semester-III							
Sr. No.	Subject Code	Subject Name	L	T	P	Hrs.	Credits
1	PEEC 911	Wireless Sensor Networks/Network Security and	3	0	0	3	3

		Cryptography/Advanced Computer Networks					
2	OEEC 911	Electronic Product Design/ Soft Computing /Optical Communication Systems	3	0	0	3	3
3	PCEC 911	Dissertation (Part-1)	0	0	20	20	10
		Total	6	0	20	26	16
Semester-IV							
Sr. No.	Subject Code	Subject Name	L	T	P	Hrs.	Credits
1	PCEC 921	Dissertation (Part-2)	0	0	32	32	16
		Total	0	0	32	32	16

Total Credits: 68

List of Open Elective Courses

Sr. No.	Sub Code	Subject Name
1	OEEC 911A	Electronic Product Design
2	OEEC 911B	Soft Computing
3	OEEC 911C	Optical Communication Systems

Assessment rubrics

The designed Curriculum have effectiveness, well-structured, Choice based credit system, industry-based syllabus, flexibility, and high theory to practical ratio following outcome-based education ✓	10 marks
The designed Curriculum have effectiveness, well-structured, Choice based credit system, industry-based syllabus, flexibility, and high theory to practical ratio	08 marks
The designed Curriculum have effectiveness, well-structured, Choice based credits, industry-based syllabus, and high theory to practical ratio	06 marks
The designed Curriculum have effectiveness, well-structured, Choice based credits and industry-based syllabus	04 marks
The designed Curriculum well-structured, Choice based credits and have effectiveness	02 marks

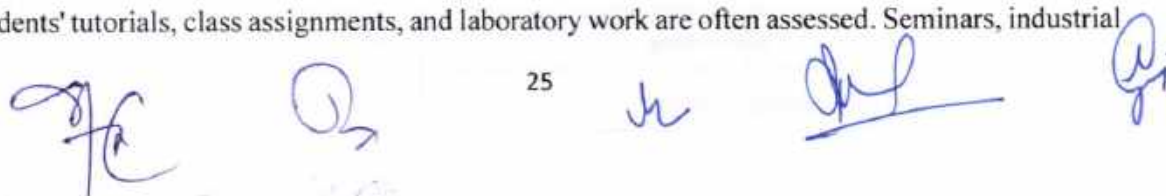
2. Formal Academic Load on Students [Teaching, Laboratory/Practical, Projects(minor/major)] : As per course curriculum

Assessment rubrics

8-hours formal Academic Load on Students (Laboratory/Practical, Projects) ✓	10 marks
10-hours formal Academic Load on Students (Laboratory/Practical, Projects)	08 marks
6-hours formal Academic Load on Students (Teaching, Laboratory/Practical, Projects)	06 marks
8-hours formal Academic Load on Students (Teaching, Laboratory/Practical, Projects)	04 marks
10-hours formal Academic Load on Students (Teaching, Laboratory/Practical, Projects)	02 marks

3. Evaluation Process (Continuing Evaluation, and End-Term Evaluation)

The students are continuously assessed to ensure that the programme content is adequate. Students' tutorials, class assignments, and laboratory work are often assessed. Seminars, industrial



training viva-voce, quizzes, assignments, midterm, and final examinations evaluate student performance. Minor project work is assessed in the 7th semester, followed by major project work in the next semester. This is followed by a Comprehensive and General Proficiency assessment (Viva-Voce).

Question papers are set in accordance to meet largely the program's COs, POs, and PSOs. Due weightage in terms of marks as well as course content of the subjects is given to each exam. The concerned teacher formulates assignments to strengthen their domain knowledge and application to complex engineering problems. The nature of the assignments drives the students to use advanced techniques, including software tools for prediction and modeling and referring to additional sources of information. These are evaluated and discussed with the students to iron out their deficiencies.

c) Theory and tutorial

The evaluation of students' performance is a continuous process based on their performances in different examinations/tests as Continuous Assessment Examinations (CAE) and End Term Examination (ETE). The total marks for each course (Theory and Practical) will be 100, each comprising two components as given below:

C. Continuous Assessment Marks (CAM) - 50 Marks

D. End Semester Exam Marks (ESM) - 50 Marks

Pattern for Internal examination (CAM)				
S. No.	Components for CAM	Syllabus Coverage for the test	Duration of the test in Hrs.	Marks (max.)
1	Minor Test - I	First 30 to 40 % of the syllabus	1	30 (equal weightage for two tests)
2	Minor Test - II	Next 30 to 40% of the syllabus	1	
3	Quiz	At least two quizzes are to be conducted	0.5	10
4	Assignment			10
	Total			50
Pattern for end semester examination (ESM)				
S. No.	Exam	Syllabus Coverage the test	Duration of the test in Hrs.	Marks (max.)
1	End Semester Exam	Full Syllabus	3	50

d) Practical (case studies)

Every practical exercise/experiment in all practical courses are evaluated based on the conduct of exercise / experiment and records maintained by the students. There is one model practical examination conducted at end semester. The criteria for awarding marks for internal assessment are given in the following table:

Items	Marks (Maximum)
Continuous assessment	50
Model practical exams	50

Total	100
Continuous assessment norms (for each exercise/experiment):	
1.Preparation	10 to 20%
2.Conduct of the exercise/experiment	20 to 30%
3.Observations made (data collection)	10 to 30%
4.Calculations, inferences, result	10 to 30%
5. Viva-voce	10 to 20%
Total	100

Assessment rubrics

Question papers, Laboratory work and Project work are aligned with the COs, POs and PSOs of the program ✓	10 marks
Routine assessment is carried out for tutorials, class assignments (> 6 and <= 10) and laboratory work assigned (> 8 and <= 10)	08 marks
Routine assessment is carried out for tutorials, class assignments (> 4 and <= 6) and laboratory work assigned (> 6 and <= 8)	06 marks
Routine assessment is carried out for tutorials, class assignments (> 2 and <= 4) and laboratory work assigned (> 4 and <= 6)	04 marks
Routine assessment is carried out for tutorials, class assignments (<= 2) and laboratory work assigned (<=4)	02 marks

4. Relevance of contents of courses taught to the students and scope of improvement

- Adequate relevant contents of courses of program specific and other allied subjects taught to students.
- Internal BOS meeting has been conducted for revision of syllabus within 3 years.

Assessment rubrics

Adequate relevant contents of courses of program specific taught to students ✓	10 marks
Adequate relevant contents of courses of other allied subjects taught to students	08 marks
Revision of syllabus within two-three years	06 marks
Revision of syllabus within four years	04 marks
Addition of new experiments	02 marks

5. Modern teaching methods in practice other than the conventional methods

- Library e-resources, other search engines (IEEE, Elsevier etc) are available to students.
 - Course Materials, PPT developed by the faculty, need to develop more video lectures and E-Assisted Learning.
 - Smart classrooms have been equipped with simulation tools for better understanding of design concepts.
- (i) Availability of Library Resources and Major Search Engines (like Scopus, Web of science)
- (ii) *Multi-Media Assisted Teaching*

Assessment rubrics

Course Materials, videos and PPT developed by the faculty	10 marks
Course Materials PPT developed by the faculty ✓	08 marks
Library sources and Major search engine made available to students and Multimedia assisted teaching	06 marks

Multimedia assisted teaching >65% and <100%	04 marks
Multimedia assisted teaching >25% and < 65%	02 marks

6. Technical Societies / Colloquium for Students

- Departmental Society: Electronic Society
- Student Chapter(s) of Professional Societies: ISTE, IEEE

Assessment rubrics

Technical Societies / Colloquium for Students and Student Chapter(s) of Professional Societies- 100 % participation of sanctioned strength	10 marks
Technical Societies / Colloquium for Students: 80 % participation of sanctioned strength ✓	08 marks
Technical Societies / Colloquium for Students: 60 % participation of sanctioned strength	06 marks
Student Chapter(s) of Professional Societies: 60 % participation of sanctioned strength	04 marks
Student Chapter(s) of Professional Societies: 40 % participation of sanctioned strength	02 marks

7. Tour/Training/Industrial visits/Internship opportunities

Four weeks training in reputed industry/laboratory in Institutions of repute such as IITs, NITs, CSIR, DRDO, CSIO etc. is mandatory as per course curriculum. Student attended ATAL sponsored industrial tour.

Assessment rubrics

Average Number of tours and industrial visits/class/year > 2 and internships	10 marks
Average Number of tours and industrial visits/class/year >1 to <=2 and internships	08 marks
Average Number of tours and industrial visits/class/year >1 to <=2	06 marks
Average Number of tours and industrial visits/class/year >0.25 <=1 and internships ✓	04 marks
Average Number of tours and industrial visits/class/year >0.25 to <=1	02 marks

8. Collaboration with other departments (within institute)

Two-day online workshop on "Scientific Writing Using LaTeX"	March 14-15,2022	Er. Vipul Singhal and Dr. Ashwani Aggarwal
Research related to Precision Agriculture in collaboration with other departments as per Vision-2030		Dr. Dilip Kumar, Prof.(ECE) Convener

Collaborative research is being conducted by the PG/PhD research scholars and faculty members of the department.

Assessment rubrics

Collaboration with other departments for 5 events in a year	10 marks
Collaboration with other departments for 4 events in a year ✓	08 marks
Collaboration with other departments for 3 events in a year	06 marks
Collaboration with other departments for 2 events in a year	04 marks
Collaboration with other departments for 1 events in a year	02 marks

Events: Expert lectures, Project/ Thesis supervision/ subject teaching etc.

9. Faculty mentoring/Faculty advisor system for class of students

This faculty-student interaction helps to understand the problems faced by the students during the teaching-learning process and gain insight to strengthen it further. The slot is fixed for the students to interact with a teacher after classes/labs for

- Class counsellor-student meeting
- Course counsellor-student meeting
- Training coordinator-student meeting

Assessment rubrics

Faculty mentoring/faculty adviser are available to admitted students >91% ✓	10 marks
Faculty mentoring/faculty adviser are available to admitted students >81 and <90%	08 marks
Faculty mentoring/faculty adviser are available to admitted students >71 and <80%	06 marks
Faculty mentoring/faculty adviser are available to admitted students >61 and <70%	04 marks
Faculty mentoring/faculty adviser are available to admitted students >51 and <60%	02 marks

10. Monitoring and continuous evaluation of the project work assigned to the students (mechanism)

Supervisors are allotted to students in 2nd semester. Continuous monitoring is done through time-to-time presentations

Assessment rubrics

Number of continuous evaluations of project work > 3 ✓	10 marks
Number of continuous evaluations of project work = 3	08 marks
Number of continuous evaluations of project work = 2	06 marks
Number of continuous evaluations of project work = 1	04 marks
Number of continuous evaluations of project work = 0	02 marks

A.4 Doctoral (Ph.D.) Programmes

1. Intake of Ph.D. Students (As per available slots)

2022-23:

1. Pratima Malhotra Date of Enrolment, 16.01.2023(Full time with fellowship)

Assessment rubrics

Number of students admitted is 80-100% of number allocated in seat matrix in all categories✓	10 marks
Number of students admitted is 60-79% of number allocated in seat matrix in all categories	08 marks
Number of students admitted is 40-59% of number allocated in seat matrix in all categories	06 marks
Number of students admitted is 20-39% of number allocated in seat matrix in all categories	04 marks
Number of students admitted is <20% of number allocated in seat matrix in all categories	02 marks

2. Admission Process

Conducted twice in the year according to the Ordinances & Rules and Regulations for Doctor of Philosophy (Ph.D.) degree of the Institute.

2022-23:

1	Pratima Malhotra	All guidelines fulfilled and students are GATE/ NET qualified and interviewed
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Assessment rubrics

All guidelines fulfilled and students are GATE/ NET qualified and interviewed✓	10 marks
All guidelines fulfilled and students are SET qualified and interviewed	08 marks
All guidelines fulfilled and students are SET qualified	06 marks
Minor deviations from guidelines fulfilled and students are SET qualified	04 marks
Major deviations from guidelines fulfilled and students are SET qualified	02 marks

3. Pre-Ph.D. Courses and Evaluation Process

There are no Pre-Ph.D Courses. However, after enrolment the candidate has to register for prescribed coursework and clear the course with satisfactory grade. In addition, the candidate has to present two seminars in the area of research.

2022-23:

1. Pratima Malhotra Completed coursework and presented seminars

Assessment rubrics

All admitted candidates complete coursework and seminar in stipulated time.✓	10 marks
80% of admitted candidates complete coursework and seminar in stipulated time	08 marks
60% of admitted candidates complete coursework and seminar in stipulated time	06 marks
40% of admitted candidates complete coursework and seminar in stipulated time	04 marks
20% of admitted candidates complete coursework and seminar in stipulated time	02 marks

4. Breadth and Depth of Knowledge of Students

Candidates are admitted through a well laid out admission process, either based on their GATE scores or SET scores. In addition, the admission is based on a presentation by the candidate and a technical interview by the DRC.

2022-23:

1	Pratima Malhotra	The student scored 70% in qualifying examination and interview
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Assessment rubrics

90-100% score in qualifying examination and interview	10 marks
80-89% score in qualifying examination and interview	08 marks
70-79% score in qualifying examination and interview ✓	06 marks
60-69% score in qualifying examination and interview	04 marks
50-59% score in qualifying examination and interview	02 marks

5. Seminar/ Presentations and Technical Communication

- | | |
|---------------------------|--|
| 1. Rajdavinder Kaur Sidhu | Annual progress presentation |
| 2. Jasvir Singh Kalsi | Annual progress presentation and fellowship extension |
| 3. Sharu Bansal | Annual progress presentation and fellowship Extension presentation |
| 4. Radha Singla | Annual progress presentation |
| 5. Sudhir Kumar | Annual progress presentation and fellowship Extension presentation |
| 6. Ayushman Ramola | Annual progress presentation |
| 7. Tarun Kumar | Annual progress presentation |
| 8. Vivek Harshey | Completed coursework and presented credit seminars |
| 9. Kumar Gaurav Suman | Completed coursework and presented credit seminars |
| 10. Kuldip Singh | Completed coursework and presented credit seminars |
| 11. Vipul Singhal | Completed coursework and presented credit seminars |
| 12. Pratima Malhotra | Completed coursework and presented credit seminars |

Assessment rubrics

All students present progress seminar and submit report within stipulated time ✓	10 marks
80% students present progress seminar and submit report within stipulated time	8 marks
60% students present progress seminar and submit report within stipulated time	6 marks
40% students present progress seminar and submit report within stipulated time	4 marks
20% students present progress seminar and submit report within stipulated time	2 marks

6. Research Facilities available in the Department

PG Research Lab: HFSS Software, MultiSIM, Comsol, LabView, Spectrum Analyser.

ONDR Research Lab: Laser Source, Spectrometer, Optical Spectrum Analyser, Fusion Splicer, Experiment Setup Light Runner Standard, Fiber Cleaver, Fiber Stripper, Optical Fiber, Optical Time Domain Reflectometer (OTDR), Simulator for network design: OptiSimv3.1, FemSim, Optisystem V.1, MatLab, etc.

Electromagnetic and Measurement Research Lab: VECTOR NETWORK ANALYZER (20GHz) (Under FIST-DST Grant), ANECHOIC CHAMBER, USB AVERAGE POWER SENSOR, ADVANCED SYSTEM DESIGN (ADS) Software Tool. Horn Antenna (upto 18 GHz), RF Cable, RF Connectors.

VSLI and Signal Processing Research Lab: Image Processing Equipment (Monochrome Machine Vision System): Sony IEEE1394 Monochrome Camera 1024x768 Resolution 30FPS, NI-PCI-8252, IEEE1394 Integrated Board and Vision Acquisition Software, IEEE1394,

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400MBPS Non-Latching Cable, 2-5 meters, Lens 2mm Fixed, NI PCI-7344, 4-Axis Servo/Step Motion Controller for Window, UMI-7744 Universal Motion Interface with D-Stub Connectors for Industrial Applications, SH68-C68-S68 Pin VHDCS to 68 Pin 05 Series D-type 12m, Sony & National Instruments Wireless Communication Hardware:WLS-911,Power Suppl, National Instruments RGB Image Processing Equipment including Color RGB Camera Lens 12mm, Cable I/O cable, Cable IEEE1394B to 1394BNI Vision Development module with Run Time License.

Assessment rubrics

Comparable with institute of national eminence ✓	10 marks
Comparable with institute of regional eminence	8 marks
Comparable with peer departments within Institute	6 marks
Somewhat less than peer departments within Institute	4 marks
Significantly less than peer departments within Institute	2 marks

7. Average Number of Research Students/Faculty

No. of faculty 7 (Eligible for supervision)
 No. of Research Students 12
 Average No. of Research Students/Faculty 1.71

Assessment rubrics

Average number of Research Students/Faculty 8	10 marks
Average number of Research Students/Faculty 6	8 marks
Average number of Research Students/Faculty 4	6 marks
Average number of Research Students/Faculty 3	4 marks
Average Number of Research Students/Faculty 2 ✓	2 marks

8. Average Number of Research Papers of Ph. D Students (Indexed Journals)

2022-23

Thesis submitted:

1.	Amit Shakya	Defence date 25/11/2022
2.	Rajeev Kumar	Defence date 08/09/ 2022
3.	Vishal Sharma	Defence date 01/12/2022
4.	Ayushman Ramola	Defence date 19/06/2023
5.	Sarbjeet Singh	Defence date 12/12/ 2022
6.	Amandeep Kaur	Defence date 18/10/2022
7.	Alka Singla	Defence date 01/06/2023

Research Papers:

- Gaddikeri, Venkatesh, Murtaza Hasan, Dilip Kumar, Arjamadatta Sarangi, and Wasi Alam. "Performance Analysis and Measurement of Soil Moisture Content by Piezoresistive Sensor." *MAPAN* 37, no. 1 (2022): 149-160, I.F. 1.446
- Kumar Dilip, and Ujala Choudhury. "Agriculture-IoT-Based Sprinkler System for Water and Fertilizer Conservation and Management." *Design and Development of Efficient Energy Systems* (2022): 229-244.
- Dilip kumar, Sudhir kumar, "Lower index liquid chemical detection by using photonic crystal fiber sensor," *Materials Today: Proceedings* 64(1), 69-73, 2022.
- Dilip Kumar, Tarun Kumar and Gurmohan Singh, "Performance Analysis of Quantum Classifier on Benchmarking Datasets," *International Journal of Electrical and Electronics Research (IJEER)*, Vol 10 (2), 375-380, 2022.
- Dilip Kumar, Tarun Kumar and Gurmohan Singh. "Error Mitigation of Grover's Quantum Search Algorithm." *Indian Journal of Pure & Applied Physics (IJPAP)* 60 (8), 644-649, 2022 I.F. 0.846.
- Dilip Kumar and Sudhir Kumar, "Sensitivity Measurement based on the Refractive Index Detection of Dual-Coated PCF SPR Sensor," *MAPAN*, 1-7, 2022, I.F. 1.446
- Kaur Amandeep, Ajay Pal Singh Chauhan, and Ashwani Kumar Aggarwal. "An automated slice sorting technique for multi-slice computed tomography liver cancer

- images using convolutional network." *Expert Systems with Applications* 186 (2021): 115686, I.F. 8.665.
8. Kaur Amandeep, Ajaypal Singh Chauhan, and Ashwani kumar Aggarwal. "Prediction of Enhancers in DNA Sequence Data Using a Hybrid CNN-DLSTM Model." *IEEE/ACM Transactions on Computational Biology and Bioinformatics* (2022), I.F. 4.5
 9. Kaur, Amandeep, Ajay Pal Singh Chauhan, and Ashwani Kumar Aggarwal. "Dynamic Deep Genomics Sequence Encoder for Managed File Transfer." *IETE Journal of Research* (2022): 1-13, I.F. 1.87
 10. Kumar, Ashish, Bikash Chandra Sahoo, Gurmeet Singh, and A. P. Singh. "Design of Micro-Machined Frequency Reconfigurable Cascaded Sierpinski Gasket Fractal Antenna using RF-MEMS Switches." In *2021 IEEE MTT-S International Microwave and RF Conference (IMARC)*, pp. 1-4. IEEE, 2021.
 11. Kumar, Ashish, and Amar Partap Singh Pharwaha. "On the design and analysis of micro-machined frac truss-based fractal patch antenna for multiband applications." *International Journal of Ultra-Wideband Communications and Systems* 5, no. 1 (2022): 25-34.
 12. Khehra, Baljit Singh, Amar Partap Singh Pharwaha, Balkrishan Jindal, and Bhupinder Singh Mavi. "Classification of clustered microcalcifications using different variants of backpropagation training algorithms." *Multimedia Tools and Applications* 81, no. 12 (2022): 17509-17526, I.F. 2.577
 13. Harshey, Vivek, Pankaj Kumar Das, and Shivani Sharma. "Low power dynamic CMOS inverter and SRAM cell design using LECTOR and LECTOR-B technique."
 14. R. Kumar, S. Singh, A. P. Chauhan, "Multiband antenna design based on Gosper fractal for implantable biomedical devices," *International Journal of Microwave and Wireless Technologies*, pp. 1-11, <https://doi.org/10.1017/S1759078721001203>, I.F. 1.09
 15. Vishal Sharma, Surinder Singh and Lovkesh, "Development of frequency comb generation by spectral broadening of periodic optical pulses in semiconductor laser amplifiers," *Journal of Optics*, Vol. 24, 045701, 2022, I.F. 2.077.
 16. Amit Kumar Shakya, Ayushman Ramola, Surinder Singh, and Vien Van, "Design of an ultra-sensitive bimetallic anisotropic PCF SPR biosensor for liquid analytes sensing," *Optics Express*, Vol. 30 (6), 9233-9255, 2022, I.F. 3.833
 17. H. Singh, A. Gupta, R. S. Kaler, S. Singh and A. S. Gill, "Designing and Analysis of Ultrathin Metamaterial Absorber for W Band Biomedical Sensing Application," in *IEEE Sensors Journal*, vol. 22, no. 11, pp. 10524-10531, 1 June 1, 2022, doi: 10.1109/JSEN.2022.3168827, I.F. 4.325.
 18. Amit Kumar Shakya, Surinder Singh, "Design of refractive index sensing based on optimum combination of plasmonic materials gold with indium tin oxide/titanium dioxide," *Journal of Nanophotonics*, Vol. 16 (2), 026010, 2022, I.F. 1.494.
 19. Amit Kumar Shakya, Surinder Singh, "Design of Biochemical biosensor based on transmission absorbance and refractive index," *Biosensors and Bioelectronics-X*, Vol.10, 100089, 2022.
 20. Mallika Garg, Jagpal Singh Ubhi, Ashwani Kumar Aggarwal, "Neural Style Transfer for Image within Images and Conditional GANs for Destylization" *Journal of Visual Communication and Image Representation*, Volume 85, 103483, May 2022. (SCIE, Impact Factor 2.678).
 21. Satveer Kour, Jagpal Singh Ubhi, "Performance Evaluation of Enhanced Manhattan Mobility Model Over GM, RWP, Manhattan Grid, SLAW, and TLW Mobility Models in MANETs" *Recent Advances in Computer Science and Communication*, Volume 15, Number 7, pp. 992-1000(9), 2022.
 22. Ayushman Ramola, Anupma Marwaha, Surinder Singh, "Design of a Triple-Layered Plasmonic Biosensor for Glucose Monitoring from Urine Sample for DIABETES Prevention," *MAPAN*, Vol. 38 (02), 511-525, June 2023.
 23. Amit Kumar Shakya, Ayushman Ramola, Surinder Singh, Anurag Vidyarthi, "Optimum supervised classification algorithm identification by investigating PlanetScope and Skysat multispectral satellite data of Covid lockdown," *Geosystems and Geoenvironment*, Vol. 2 (2), 100163, May, 2023.

24. Taranjeet Kaur, Surinder Singh, Lovkesh, "Design and placement of EAM based wavelength converter in resilient network with arbitrary topology," *Optical and Quantum Electronics*, Vol. 55 (3), 270, March 2023.
25. Amit Kumar Shakya, Surinder Singh, "Development of a generalized Fourier transform model for distinct household oil samples by performing spectroscopy analysis," *Results in Optics*, Vol. 10, 100355, February 2023.
26. Sandeep Kohar, Surinder Singh, Asok De, "Investigations on the Wideband Characteristics of a Cylindrical Conformal U-slot Loaded Microstrip Patch Antenna for X-Band Airborne Applications," *IETE Journal of Research*, doi.org/10.1080/03772063.2022.2150699, January 2023.
27. Vishal Sharma, Surinder Singh, Lovkesh, "Design of tunable optical frequency comb generation based on electro-optic modulator," *Photonic Network Communications*, Vol. 44 (2-3), 133-140, December 2022.
28. Amit Kumar Shakya, Surinder Singh, "Design of a novel refractive index BIOSENSOR for heavy metal detection from water samples based on fusion of spectroscopy and refractive index sensing," *Optik*, Vol. 270, 169892, November 2022.
29. Vishal Sharma, Surinder Singh, Lovkesh, "200 Gb/s PAM4 modulator design without DAC for inter Data-Centre Communication," *Optical and Quantum Electronics*, Vol. 54 (10), 677, October 2022.
30. Rajeev Kumar, Surinder Singh, Ajay Pal Singh Chauhan, "Multiband antenna design based on Gosper fractal for implantable biomedical devices," *International Journal of Microwave and Wireless Technologies*, Vol. 14 (8), 970-980, October 2022.
31. Rajeev Kumar, Surinder Singh, "Low Profile Microstrip Resonator Dielectric Sensor for Development of Artificial Phantom," *IEEE Sensor Journal*, Vol. 22 (21), 20448-20455, September 2022.
32. Amit Kumar Shakya, Surinder Singh, "State of the art in fiber optics sensors for heavy metals detection," *Optics & Laser Technology*, Vol. 153, 108246, September 2022.
33. Lovkesh, Dilbag Singh, Surinder Singh, Sukhbir Singh, "Performance analysis of all optical contention detection circuit for high speed optical access networks," *Optical and Quantum Electronics*, Vol. 54 (7), 401, July 2022.
34. S. Kaur, S. Singh and M. M. Sinha "Design of round corner rectangular planar sensor with DGS for measurement of permittivities" In *2023 IEEE Applied Sensing Conference (APSCON)*, pp. 1-3, Jan 2023.
35. S. Kaur, S. Singh and M. M. Sinha. "Design of 3-slot loaded with T-edge rectangular patch sensor for measurement of relative permittivity". *Materials Today: Proceedings*, 78, 798-803.
36. S. Kaur, S. Singh and M.M. Sinha, "Design of round corner rectangular planar sensor with circular slot for estimation of permittivity and conductivity of material" in *2023 IEEE Applied Sensing Conference (APSCON)*, pp. 1-3, Jan 2023.
37. Avinash Chandra, Naveen Mishra, Rajkishor Kumar, Kundan Kumar and Hemaprasad Patil, "A superstrate and FSS embedded dual band waveguide aperture array with improved far-field characteristics", *Microw. and Optical Tech. Lett.* Jan 2023.
38. Tarun kumar and Dilip Kumar, "Brain Tumour Classification Using Quantum Support Vector Machine Learning Algorithm", *IETE journal of research*, 2023 (SCI).
39. Sharu Bansal and Dilip Kumar, "Enhancing constrained application protocol using message options for internet of things", *cluster computing*, Springer, 2023, (SCI).
40. Tarun kumar and Dilip Kumar, "Error Mitigation of Grover's Quantum Search Algorithm", *Indian Journal of Pure & Applied Physics (IJPAP)*, CSIR,2022, (SCI).
41. Tarun kumar and Dilip Kumar, "Novel optimization of quantum search algorithm to minimize complexity", *Chinese Journal of Physics*, Elsevier,2023-10-09, (SCI).
42. T. Kumar and D. Kumar, "Greenhouse Monitoring and Controlling using Cloud-Based Android Application", *IEEE 8th International Conference for Convergence in Technology (I2CT)*

43. Sarbjeet Singh and Dilip Kumar, "A Public Key Authentication and Privacy-Preserving Model for Securing Healthcare System," Taylor & Francis IETE Journal of Research, (SCI Impact Factor: 2.33)
44. Sarbjeet Singh and Dilip Kumar, "IoT Based Energy-Efficient Secure Healthcare Data Fusion Scheme," Elsevier Future Generation of Computer Systems) (SCI Impact Factor: 7.5)

Average No. of Research Papers of Ph. D Students **44/12 = 03.66**

Assessment rubrics

Average number of Research Papers of Ph.D. Students ≥ 5	10 marks
Average number of Research Papers of Ph. D Students 4 ✓	8 marks
Average number of Research Papers of Ph. D Students 3	6 marks
Average number of Research Papers of Ph. D Students 2	4 marks
Average number of Research Papers of Ph. D Students 1	2 marks

9. Average Duration to Complete Ph.D. (years)

1.	Mukesh Kumar	Enrolment date 28.07.2015 Defence date 02.08.2021
2.	Ashwani Kumar	Enrolment date 22.07.2016 Defence date 12.11.2021
3.	Sandeep Kohar	Enrolment date 18.02.2013 Defence date 07.03.2022
4.	Amit Shakya	Enrolment date 06/08/2018 Defence date 25/11/2022
5.	Rajeev Kumar	Enrolment date 14/08/2017 Defence date 08/09/ 2022
6.	Vishal Sharma	Enrolment date 06/08/2018 Defence date 01/12/2022
7.	Sarbjeet Singh	Enrolment date 30/01/2015 Defence date 12/12/2022
8.	Amandeep Kaur	Enrolment date 14/08/2017 Defence date 18/10/2022
9.	Alka Singla	Enrolment date 18/07/2016 Defence date 01/06/2023
10.	Ayushman Ramola	Enrolment date 22/07/2019 Defence date 19/06/2023

Average Duration to Complete Ph.D: 5.81 years

Assessment rubrics

Average duration to complete Ph. D. 3 years	10 marks
Average duration to complete Ph. D. 4 years	8 marks
Average duration to complete Ph. D. 5 years	6 marks
Average duration to complete Ph. D. 6 years ✓	4 marks
Average duration to complete Ph. D. 7 years	2 marks

10. Participation of Research Scholars in Conferences/Workshops

Conference papers for academic year 2022-23

1. Amit Kumar Shakya, Surinder Singh, "Gold-ZnO Coated Surface Plasmon Resonance Refractive Index Sensor Based on Photonic Crystal Fiber with Tetra Core in Hexagonal Lattice of Elliptical Air Holes," Robotics, Control and Computer Vision: Select Proceedings of ICRCCV, 2022, 567-576, 26/05/2023.

2. A. Ramola, S. Singh and A. Marwaha, "Sensitivity Assessment of Human Body Fluids through PCF-Based Plasmonic Biosensor for Biomedical Applications," 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), Uttar Pradesh, India, 2022, pp. 1-6, doi: 10.1109/IC3I56241.2022.10072670.
3. A. Ramola, S. Singh and A. Marwaha, "An Exhaustive Review of Various Optical Devices for Biomedical Applications," VLSI, Communication and Signal Processing. VCAS, Lecture Notes in Electrical Engineering, vol 1024, 2022 Springer, Singapore. https://doi.org/10.1007/978-981-99-0973-5_3
4. Sigroha, D., Singh, K., Vais, R.I., "Eigen Space and ANN Based Approach to Synthesize 12-Lead ECG," Advances in VLSI, Communication, and Signal Processing. Lecture Notes in Electrical Engineering, vol 911. 2022, Springer, Singapore. https://doi.org/10.1007/978-981-19-2631-0_52

Assessment rubrics

Average number of participations ≥ 9	10 marks
Average number of participations ≥ 7 and < 9	8 marks
Average number of participations ≥ 5 and < 7	6 marks
Average number of participations ≥ 3 and < 5 ✓	4 marks
Average number of participations ≥ 1 and < 3	2 marks

B RESEARCH

B.1	Research and Industrial collaboration	Score
1.	Research Ambience in the Department	3+2+2
2.	Research Awareness among Doctoral Students	10
3.	Thrust areas of research in the department	3+3+3
4.	Quality of Research	1+2+2+2+2
5.	Collaborations with other departments (within the institute) and at National, and international levels.	10
6.	Impact and Quality of Publications	2.5+2.5+2.5+2.5
7.	Relevance of Research to Knowledge Generation and Social Relevance	5+5
8.	Student Exposure for Attending Quality Conferences/Symposia	10
9.	Inter departmental collaborations	10
10.	Industry/externally funded sponsored research. (Numbers and amount)	10
Total Score (out of 100)		

1. Research Ambience in the Department

The ECE department, with its vision of being one of the most sought-after Centres of Excellence in the field of Electronics and Communication, has provided an ambience and infrastructure for the students to become researchers and innovators. We have eleven faculty members competent to guide doctoral students. At present there are ten research scholars (regular and part time) pursuing their doctoral research.

The department has well equipped laboratories and adequate computational facilities to support the research work. All this culminates in high impact research output in the form of publications and patents.

Assessment rubrics

- 4 marks for faculty qualification,
- 3 marks for research facilities/ infrastructure
- 3 marks for number of research scholars

80-100% faculty with PhD	4 marks
60-80% faculty with PhD ✓	3 marks
40-60% faculty with PhD	2 marks
20-40% faculty with PhD	1 mark
Excellent research facilities/ research infrastructure	3 marks
Adequate research facilities/ research infrastructure ✓	2 marks
Inadequate research facilities/ research infrastructure	1 marks
Large number of research scholars	3 marks
Adequate number of research scholars ✓	2 marks
Less number of research scholars	1 marks

2. Research Awareness among Doctoral Students

As part of initial grooming, every research scholar completes a course on Research Methodology. In addition, she/he completes a course related to the proposed research area. With this initiation, the doctoral student delivers two seminars in the broad area of research. This activity provides the student with the opportunity to understand the recent developments in the proposed research area. The student further elaborates on this and engages in extensive literature review and comes up with research proposals.

- Mr. Tarun Kumar attended the online conference.
- Mr. Kunar Gaurav attended the online conference.
- All the research scholars regularly attend conferences and workshops.

Assessment rubrics

Research awareness among doctoral students by 01 conference per year ✓	10 marks
Research awareness among doctoral students by 01 workshop per year	8 marks
Research awareness among doctoral students by 02 expert lectures per year	6 marks
Research awareness among doctoral students by 01 expert lectures per year	4 marks
Research awareness among doctoral students by offering courses	2 Marks

3. Thrust areas of research in the department

- VLSI & Embedded Systems
- Broadband Communication
- Intelligent Systems & Networking

These research groups are formed to align with the expertise of faculty members and the thrust areas, which are locally, regionally, and nationally relevant. The selection of these thrust areas for ECE department is grounded in their profound relevance and impact on contemporary and future technological landscapes. These areas have been chosen due to several compelling reasons:

1. **Interdisciplinary Potential:** These thrust areas represent a multidisciplinary fusion of hardware and software, electronics, and computer science. This integration is critical in tackling complex technological challenges and fostering innovation that transcends traditional boundaries.
2. **Economic and Societal Impact:** Research in these areas has the potential to drive economic growth, create high-impact applications, and address critical societal needs, such as healthcare, education, and infrastructure development.
3. **Future-Proofing:** In an era of rapid technological evolution, focusing on these areas ensures that the department remains at the forefront of emerging trends and can equip students with skills and knowledge that are highly relevant in the job market.

VLSI & Embedded Systems

In the ever-evolving landscape of modern technology, VLSI and embedded systems have emerged as pivotal pillars of innovation and progress. These disciplines hold paramount significance in designing and developing compact, energy-efficient electronic devices that have permeated every facet of our daily lives. VLSI and embedded systems support the very fabric of our connected world. Their continued advancements enable the creation of smaller, faster, and more powerful devices and drive the exploration of emerging frontiers such as the Internet of Things (IoT), artificial intelligence, and smart cities. As we navigate an increasingly digital and interconnected reality, the research and development in VLSI and embedded systems remain integral to shaping the technological landscape, addressing societal challenges, and charting a path toward a brighter, more efficient, and sustainable future. This thrust area closely works on the current technological trends in VLSI and nanotechnology. The MoU has been signed with the SCL, Mohali, and CEERI Pilani for research work collaboration and expertise sharing. The expertise of the SCL Mohali is well known in the Punjab region.

M.Tech and Ph.D. scholars regularly visit the organization to perform their research work. Also, **Dr J S Ubhi** has published quality research papers with the scientists of SCL. This thrust area also aligns with the Gol initiative for promoting electronic chip fabrication in the country. The knowledge gained in this area is also helpful in designing sensors and embedded systems for crop yield monitoring and smart agriculture.

Broadband Communication

In our rapidly evolving digital age, 'Broadband Communication' is a vital cornerstone of our interconnected world. The demand for high-speed, ubiquitous internet access has never been greater, driven by the ever-expanding appetite for data and the growth of digital services, including streaming, telemedicine, e-learning, and remote work. Research in Broadband Communication fuels the development of robust and efficient communication networks capable of handling vast data volumes with minimal latency. It is pivotal in enabling seamless global connectivity, connecting individuals and communities, and fostering technological advancements that benefit various sectors, from healthcare to education and commerce. With the ongoing convergence of technologies such as 5G, fiber-optic networks, and satellite communication, the thrust area of Broadband Communication is indispensable in shaping our modern, hyperconnected society and driving innovation in a multitude of industries.

Today, at the national level, we are moving towards launching the 5G services in the country. Therefore, the technological infrastructure and know-how required for implementing, developing, and maintaining the 4G and 5G systems are essential. Since its inception, the ECE department has focused on areas such as Antenna design, MIMO technology, Optical communications, and published quality publications and bagged research projects in this domain. MoU signed between SLIET Longowal and Gigabyte Networks for regional collaboration in this research domain.

Also, a newly admitted research scholar is working on Terahertz antenna design, which has national relevance in the context of the 5G rollout in the country. The Broadband Communication group is carrying out research in microwave absorbers. Exposure to electromagnetic radiation stresses the human body, weakens the immune system, damages healthy cells, and can lead to cancer and infertility. Therefore, EM pollution is a global problem affecting urban populations more than rural ones. Hence, designing an efficient microwave absorber is of utmost importance for the safety of those living in high-alert electromagnetic zones. Nanomaterial-based microwave absorbers in paint can be incorporated on Aircraft surfaces to reduce their radar cross-sectional area. This technique minimizes aircraft visibility, which is helpful for military purposes.

Further, microwave absorbers tailored in resonating cavities and pyramidal structures can be used to build anechoic chambers for laboratory testing of electromagnetic equipment. Additionally, microwave absorbers in rectangular strips can reduce the mutual coupling effect in an antenna array. When placed between array elements, these strips absorb interelement antenna waves and significantly minimize the side lobe, enhancing the array's radiation pattern.

Intelligent Systems & Networking

In today's rapidly evolving technological landscape, 'Intelligent Systems and networking' is a pivotal research domain with profound implications for our connected world. The grouping of artificial

intelligence, machine learning, and networking technologies has given rise to intelligent systems capable of autonomous decision-making and problem-solving. These systems transform our digital infrastructure, enabling more innovative networks, automated processes, and efficient resource allocation. They play a fundamental role in developing smart cities, autonomous vehicles, and the Internet of Things (IoT), enhancing efficiency, security, and sustainability. Research in this dynamic field propels the creation of resilient and adaptive networks, fostering innovation across industries while ensuring seamless connectivity and data-driven insights. As we navigate the complexities of our digital age, 'Intelligent Systems & Networking' continues to be at the forefront of advancing technology, delivering solutions that empower businesses and improve the quality of life.

With the emergence of Artificial Intelligence and Smart systems in every sphere of daily life, it becomes increasingly important to align the research work with this domain. To this end, the ECE department focuses on developing and designing tools and techniques to aid precision agriculture. The group works on thematic areas like remote sensing and drone technology, which is relevant to the need of farmers of the local and Punjab region.

UG students are encouraged to design a project that closely aligns with these thrust areas. Ph.D. scholars are also enrolled for research in this domain to develop intelligent systems for local farmers to boost crop yield using IoT and machine learning. The Punjab region has a high prevalence of cancer cases. Therefore, the department is also working closely with Homi Bhabha Cancer Hospital, Sangrur.

Research group is working on the design of SPR Sensor Modelling for Heavy Metal Detection to aid in the disease diagnosis prevalent in the region. Also, many past and current research scholars are working in IoT and quantum computing domains to push the frontiers of national knowledge as per the vision of GoI to achieve self-suitability.

Assessment rubrics

- 4 marks for national relevance,
- 3 marks for regional or local relevance

80-100% thrust areas nationally relevant	4 Marks
60-80% thrust areas nationally relevant ✓	3 Marks
40-60% thrust areas nationally relevant	2 Marks
20-40% thrust areas nationally relevant	1 Marks
70-100% thrust areas regionally relevant ✓	3 Marks
40-70% thrust areas regionally relevant	2 Marks
10-40% thrust areas regionally relevant	1 Marks
70-100% thrust areas locally relevant ✓	3 Marks
40-70% thrust areas locally relevant	2 Marks
10-40% thrust areas locally relevant	1 Marks

4. Quality of Research

2022-2023

1. Vishal Sharma, **Surinder Singh**, Lovkesh, "200 Gb/s PAM4 modulator design without DAC for inter Data-Centre Communication," Optical and Quantum Electronics, Vol. 54 (10), 677, October 2022.
2. Vishal Sharma, **Surinder Singh**, Lovkesh, "Design of tunable optical frequency comb generation based on electro-optic modulator," Photonic Network Communications, Vol. 44 (2-3), 133-140, December 2022.
3. Ayushman Ramola, **Anupma Marwaha**, Surinder Singh, "Design of a Triple-Layered Plasmonic Biosensor for Glucose Monitoring from Urine Sample for DIABETES Prevention," MAPAN, Vol. 38 (02), 511-525, June 2023.
4. Taranjeet Kaur, **Surinder Singh**, Lovkesh, "Design and placement of EAM based wavelength converter in resilient network with arbitrary topology," Optical and Quantum Electronics, Vol. 55 (3), 270, March 2023.

5. Sandeep Kohar, **Surinder Singh**, Asok De, "Investigations on the Wideband Characteristics of a Cylindrical Conformal U-slot Loaded Microstrip Patch Antenna for X-Band Airborne Applications," *IETE Journal of Research*, doi.org/10.1080/03772063.2022.2150699, January 2023.
6. **Vishal Sharma**, Surinder Singh, Lovkesh," Design of tunable optical frequency comb generation based on electro-optic modulator," *Photonic Network Communications*, Vol. 44 (2-3), 133-140, December 2022.
7. Amit Kumar Shakya, **Surinder Singh**, "Design of a novel refractive index BIOSENSOR for heavy metal detection from water samples based on fusion of spectroscopy and refractive index sensing," *Optik*, Vol. 270, 169892, November 2022.
8. **Vishal Sharma**, Surinder Singh, Lovkesh," 200 Gb/s PAM4 modulator design without DAC for inter Data-Centre Communication," *Optical and Quantum Electronics*, Vol. 54 (10), 677, October 2022.
9. Rajeev Kumar, Surinder Singh, **Ajay Pal Singh Chauhan**, "Multiband antenna design based on Gosper fractal for implantable biomedical devices," *International Journal of Microwave and Wireless Technologies*, Vol. 14 (8), 970-980, October 2022.
10. Rajeev Kumar, Surinder Singh, "Low Profile Microstrip Resonator Dielectric Sensor for Development of Artificial Phantom," *IEEE Sensor Journal*, Vol. 22 (21), 20448-20455, September 2022.
11. Amit Kumar Shakya, Surinder Singh, "State of the art in fiber optics sensors for heavy metals detection," *Optics & Laser Technology*, Vol. 153, 108246, September 2022.
12. Lovkesh, Dilbag Singh, Surinder Singh, Sukhbir Singh, "Performance analysis of all optical contention detection circuit for high-speed optical access networks," *Optical and Quantum Electronics*, Vol. 54 (7), 401, July 2022.
13. Amit Kumar Shakya, Ayushman Ramola, Surinder Singh, Anurag Vidyarthi, "Optimum supervised classification algorithm identification by investigating PlanetScope and Skysat multispectral satellite data of Covid lockdown," *Geosystems and Geoenvironment*, Vol. 2 (2), 100163, May 2023.
14. Amit Kumar Shakya, Surinder Singh, "Development of a generalized Fourier transform model for distinct household oil samples by performing spectroscopy analysis," *Results in Optics*, Vol. 10, 100355, February 2023.
15. **Alka Singla**, Anupma Marwaha and Sanjay Marwaha, "Multi-Stacked and Nitrogen Doped Graphene Layers for Microwave Hyperthermia Treatment Planning with Least Exposure Time", *Journal of Engineering Science and Technology (JESTEC)* Vol. 18, Issue 4, August 2023. [ESCI; IF:0.243].
16. Alka Singla, **Anupma Marwaha** and Sanjay Marwaha, "Multi-Criterion Optimization of Invasive Antenna Applicators for Au@Fe₃O₄, Au@-Fe₂O₃ and Au@-Fe₂O₃ mediated Microwave Ablation Treatment" *Electromagnetic Biology and Medicine*, Vol. 42(1), pp. 21-40, 2023 DOI: 10.1080/15368378.2023.2184381. [SCI indexed; IF:1.93]
17. Surekha Rani, **Anupma Marwaha**, Sanjay Marwaha, Alka Singla, "Utilization of geometry inspired array absorbers for electromagnetic device testing", *International Nano Letters*, Vol. 13(1), pp.87-91, 2023. [SCI indexed; IF:3.5]
18. **Alka Singla**, Anupma Marwaha, Sanjay Marwaha and Surekha Rani, "Flexible Graphene Sheet Loaded Curved Patch Applicator for Superficial Hyperthermia Treatment Planning Utilizing Ripple Effect of Armchair and Zigzag Bending", *Current Nanoscience*, Vol. 19(4), pp. 589-600, 2023. [SCIE; IF:1.5]. DOI: 10.214/1573413718666220701145146.
19. Rajni Bala, **Anupma Marwaha**, Gaurav Bansal and Sanjay Marwaha, "Estimation of the Speed of the Vehicle Using MATLAB", *Asian Journal of Electrical Sciences*, Vol. 11(2), pp.35-38, 2022. (Scopus)
20. Rupam, Marwaha Sanjay and **Marwaha Anupma**, "Average Torque Improvement of BLDC Motor in Battery Electric Vehicle", *International Journal of Advanced Technology*

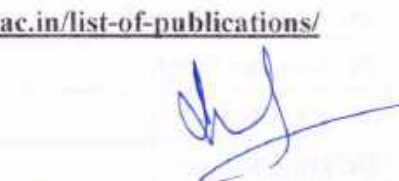

- and Engineering Exploration, Vol.9(95), pp. 1522-1538, 2022. DOI: <http://dx.doi.org/10.19101/IJATEE.2021.875874>. (Scopus)
21. Rupam, Marwaha Sanjay and **Marwaha Anupma**, "FEA based design of outer rotor BLDC motor for Battery Electric Vehicle", International Journal of Electrical and Electronics Research, Vol. 10 (4), 2022, DOI: FEA Based Design of Outer Rotor BLDC Motor for Battery Electric Vehicle. (Scopus)
 22. Garg Mallika, **Ubhi Jagpal Singh**, and Ashwani Kumar Aggarwal. "Neural style transfer for image within images and conditional GANs for destylization." Journal of Visual Communication and Image Representation 85 (2022): 103483.
 23. Garg Mallika, **Jagpal Singh Ubhi**, and Ashwani Kumar Aggarwal. "Neural style transfer for image steganography and destylization with supervised image to image translation." Multimedia Tools and Applications 82.4 (2023): 6271-6288.
 24. Satveer, Satveer Kour, **Jagpal Singh Ubhi**, and Manjit Singh. "QoS Improvement using Enhanced Manhattan Mobility Model on Proposed Ant Colony Optimization Technique in MANETs: ACO OPTIMIZATION IN MOBILITY EFFICIENT MANETS." Journal of Scientific & Industrial Research (JSIR) 82.06 (2023): 616-628.
 25. Kour, Satveer, and **Jagpal Singh**. "Performance Evaluation of Enhanced Manhattan Mobility Model Over GM, RWP, Manhattan Grid, SLAW, and TLW Mobility Models in MANETs." Recent Advances in Computer Science and Communications 15.7 (2022): 992-1000.
 26. Kumar, Tarun, Dilip Kumar, and Gurmohan Singh. "Brain Tumour Classification Using Quantum Support Vector Machine Learning Algorithm." *IETE Journal of Research* (2023): 1-14.
 27. Kumar, Tarun, **Dilip Kumar**, and Gurmohan Singh. "Brain Tumour Classification Using Quantum Support Vector Machine Learning Algorithm." *IETE Journal of Research* (2023): 1-14.
 28. Kumar, Rajeev, **Dilip Kumar**, and Dinesh Kumar. "SMBF: Secure Data Transmission using Modified Bloom Filter for Vehicular Ad Hoc Networks." *Recent Advances in Computer Science and Communications (Formerly: Recent Patents on Computer Science)* 16.5 (2023): 47-56.
 29. Chandra, A., Mishra, N., Kumar, R., **Kumar, K.**, & Patil, H. Y. (2023). A superstrate and FSS embedded dual band waveguide aperture array with improved far-field characteristics. *Microwave and Optical Technology Letters*, 65(1), 341-347.
 30. Kumar, A., Kumar, V., Sharma, R., & **Pharwaha, A. P. S.** (2023). On the Development of Compact Super-Wideband Fractal Antenna. *Indian Journal of Science and Technology*, 16(15), 1145-1152.
 31. Khehra, B. S., **Pharwaha, A. P. S.**, Jindal, B., & Mavi, B. S. (2022). Classification of clustered microcalcifications using different variants of backpropagation training algorithms. *Multimedia Tools and Applications*, 81(12), 17509-17526.
 32. **Sarbjeet Singh** and Dilip Kumar, "A Public Key Authentication and Privacy-Preserving Model for Securing Healthcare System," Taylor & Francis *IETE Journal of Research*, (**SCI Impact Factor: 2.33**)
 33. **Sarbjeet Singh** and Dilip Kumar, "IoT Based Energy-Efficient Secure Healthcare Data Fusion Scheme," Elsevier *Future Generation of Computer Systems*) (**SCI Impact Factor: 7.5**)

List of all the publications is available on <http://ece.sliet.ac.in/list-of-publications/>

Average impact factor is for the year 2022-23 is 2.31

Assessment rubrics



- 2 marks for patent, 2 marks for total impact factor, 2 marks for citation per faculty (WoS), 2 marks for citation per faculty (Scopus), 2 marks for citation per faculty (Google Scholar)

Patent granted	2 marks
Patent published/filed ✓	1 mark
Average impact factor ≥ 2 ✓	2 marks
Average impact factor 1-2	1 mark
citation per faculty (WoS) ≥ 200 ✓	2 marks
citation per faculty (WoS) 100-200	1 mark
citation per faculty (Scopus) ≥ 200 ✓	2 marks
citation per faculty (Scopus) 100-200	1 mark
citation per faculty (Google Scholar) ≥ 300 ✓	2 marks
citation per faculty (Google Scholar) 200-300	1 mark

5. Collaborations with other departments (within the institute) and at National, and international levels:

- MoU signed between SLIET Longowal and Institute of Material Science, Institute of Materials Science, Vietnam Academy of Science and Technology, Vietnam.
- Dr. Amit Gupta, Punjab Technical University, Jalandhar, joined under the mentorship of Dr Surinder Singh in TARE scheme of SERB.
- More details of the MoU and the collaboration with other departments is available on the following link. <http://ece.sliet.ac.in/mou/>
- Various STC and workshops are organized by the ECE department in collaboration with the other department.
- Research scholar Ms Swarn Preet is admitted in the Physics department under joint guidance.
- **Assessment rubrics**

Collaboration with other departments for 5 events in a year ✓	10 marks
Collaboration with other departments for 4 events in a year	08 marks
Collaboration with other departments for 3 events in a year	06 marks
Collaboration with other departments for 2 events in a year	04 marks
Collaboration with other departments for 1 events in a year	02 marks

- **Events:** Expert lectures, Project/ Thesis supervision/ subject teaching etc

6. Impact and Quality of Publications

Average Citations per Faculty/Year (Last-Three Years) (Web of Science/Scopus/Google scholar)

Faculty	Designation	Citations	h-Index
Dr. A. P. Singh Pharwaha	Professor	Google Scholar 2055	19
Dr. Anupma Marwaha	Professor	Google Scholar 1168	17
Dr. Surinder Singh	Professor	Google Scholar 2050	26
Dr. J.S. Ubhi	Professor	Google Scholar 429	10
Dr. Dilip Kumar	Professor	Google Scholar 3210	27
Dr. Ajay Pal Singh	Professor	Google Scholar 212	7
Er. Pankaj Kumar Das	Assistant Professor	Google Scholar 110	5
Er Vivek Harshey	Assistant Professor	Google Scholar 04	2

Er Vipul Singhal	Assistant Professor	Google Scholar 10	1
Dr Kundan Kumar	Assistant Professor	Google Scholar 271	8
Dr Amandeep Kaur	Assistant Professor	Google Scholar 67	4
Dr Vishal Sharma	Assistant Professor	Google Scholar 63	6
Dr Sarbjeet Singh	Assistant Professor	Google Scholar 20	2
Total Citations		9649	
Average Citation per faculty per year		≈ 160	

Assessment rubrics

- 2.5 marks for total impact factor, 2.5 marks for citation per faculty (WoS), 2.5 marks for citation per faculty (Scopus), 2.5 marks for citation per faculty (Google Scholar)

Average impact factor ≥ 2 ✓	2.5 marks
Average impact factor 1-2	1.5 marks
citation per faculty (WoS) ≥ 20 ✓	2.5 marks
citation per faculty (WoS) 10-20	1.5 marks
citation per faculty (Scopus) ≥ 20 ✓	2.5 marks
citation per faculty (Scopus) 10-20	1.5 marks
citation per faculty (Google Scholar) ≥ 30 ✓	2.5 marks
citation per faculty (Google Scholar) 20-30	1.5 marks

7. Relevance of Research to Knowledge Generation and Social Relevance

Research done in the Department has contributed to the body of science as evident by the number and quality of publications. The research is socially relevant as it is in line with goal of sustainable development, one of the key thrust areas of the Govt. of India.

Assessment rubrics

5 marks for Knowledge Generation, 5 marks for Social Relevance with respect to thrust area

Total publications ≥ 30 ✓	5 marks
Total publications 20-30	4 marks
Total publications 10-20	3 marks
Total publications < 10	2 marks
All thrust areas covered ✓	5 marks
No thrust area covered	0 marks

8. Inter departmental collaborations.

- Prof. Anupama Marwaha collaborated with Dr. Sanjay Marwaha, Professor, EIE.
- Prof. Ajay Pal Singh, collaborated with Dr. Ashwini Kumar, AsP, EIE
- Prof. J.S. Ubhi collaborated with Dr. Solomon Raja Kota, Principal Scientist, CEERI Pilani.
- Prof. J.S. Ubhi collaborated with Dr. Alpana Aggrawal TIET Patiala.
- Prof. Surinder Singh collaborated with Prof. M M Sinha, Physics Department, SLIET.

Assessment rubrics

2 marks each for collaboration for Ph. D. research guidance or for collaboration for sponsored project or for other collaboration

9. Industry/externally funded sponsored research (Numbers and amount)

(a) Research and Development Projects

Title of the Project	Chief Investigator	Funding Agency	Cost of the project
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Design and Development of System-on-Chip for Single-Lead Wearable Electrocardiogram (ECG) for Medical Devices under the Category- II of Chips to Startup (C2S) Programme	Chief Investigator: Prof. J.S. Ubhi, ECE Department Co-Chief Investigator: Prof. Surinder Singh, ECE Department	Ministry of Electronics & Information Technology, New Delhi	EE-9/2/2021-R&D-E dated: 26/05/2023 budget sanctioned Rs. 90,88,000/- . Duration of project 3- year & 6-months. Ongoing Project.
Design and Development of Noble C-Band Parametric Optical Frequency Comb Generator to Realize Backbone Optical Transport Network for 6G Communication	PI: Prof. Surinder Singh, ECE Department, Co-PI: Prof. J.S. Ubhi, ECE Department	Science & Engineering Research Board (SERB), New Delhi	F. No. CRG/2022/001866 dated: 30/01/2023. Budget sanctioned Rs. 23, 22, 609 Duration of project 36 months. Ongoing Project.
Design and Development of Terahertz Self- Multiplex Antennas Using Substrate Integrated Waveguide for 6G Wireless Communication System	PI: Dr. Kundan Kumar, A.P., ECE Department	Science & Engineering Research Board (SERB), New Delhi	F. No. SRG/2022/000664 dated: 06/10/2022, Budget sanctioned Rs. 16, 31, 540/- . Duration of project is 24 months. Ongoing project.
Design of High-Speed Multichannel Optical Wireless Communication System Based on Hybrid WDM Free Space Optics Transmission Link for MIMO Applications	Under Teachers Associateship for Research Excellence (TARE) to Dr. Amit Gupta, PTU, Jalandhar, Punjab under the Mentorship of Dr. Surinder Singh	Science & Engineering Research Board (SERB), New Delhi	Total Rs. 18, 30, 000/- . Duration of Project is 36 months and start date of project is 08/12/2021. Details of allocation of budget is as under: Rs. 10, 05, 000/- to SLIET, Longowal Ongoing project.
Development of Electromagnetic Measurement and Testing Lab (Financial Assistance to ECE Deptt., SLIET Longowal to augment research facilities)	Project Implementation Group: Dr. Anupma Marwaha Dr. Surinder Singh Dr. A.P. Singh	GOI, DST, R&D Infrastructure Division	Order No. FST/ET-1/2018/157 (C) of GOI, DST dated:14/03/2019 of Rs. 61,00,000/- project of 05 years. Ongoing project.

Assessment rubrics

Project amounting to \geq Rs. 50 lakhs <input checked="" type="checkbox"/>	10 marks
Project amounting to Rs. 40-50 lakhs	9 marks
Project amounting to Rs. 30-40 lakhs	8 marks
Project amounting to Rs. 20-30 lakhs	7 marks
Project amounting to Rs. 10-20 lakhs	6 marks
Project amounting to Rs. 5-10 lakhs	5 marks
Project amounting to $<$ Rs. 5 lakhs	4 marks

C. DEPARTMENTAL INFRASTRUCTURE

		Score		Remarks
		Self-Assessment	Marks Obtained	
1	Adequacy of Class Rooms and Multi-Media Facility	9		11 classrooms out of which 8 classrooms are equipped

				with multimedia facilities, sufficient as per strength
2	Availability of Laboratories	10		In place
3	Availability of Conference/Seminar Room, etc	9		Sufficient as per requirements
4	Availability of Seating Space for Faculty and Research Students	10		In place
5	Availability of Internet Services in Research Labs and Class Rooms	10		Wi-fi campus
6	Departmental Library and E-Resources	10		The library has more than 1000 textbooks and reference books. Apart from the books, the library has also a collection of Ph.D. and M.Tech theses, B.Tech and ICD project reports, and industrial training reports. The library has a reading area wherein the students and staff may go and read the study material.
7	Computing Facilities and Software	10		Sufficient number of commercial software's are available for RS, PG and UG students.
8	Adequacy of Offices and Furnishing for Faculty	10		Office rooms are sufficient as per strength however further procurement of furniture is needed to meet the requirements.
9	Faculty- Student Ratio	8		1:19.3 (Need to improve)
10	Support Staff (Technical/Administrative) Adequacy	9		Adequate
	Total Score (out of 100)	95		

1. Adequacy of Classrooms and Multi-Media Facility

Room Description	No. available	Capacity (no. of persons)	Remarks
No. of classrooms	04 (new block) +02 (old block)	100 (new block), 60 (old block)	sufficient as per strength
No. of smart classrooms	04 (new block) +01 (old block)	100 (new block), 60 (old block)	sufficient as per strength

Tutorial rooms	02	30	sufficient as per strength
Classroom with Multi-media facilities	Portable multi-media projectors - 03, e-podium-06	-	sufficient as per strength

Assessment rubrics

Availability of classes conducted in classrooms at department >75% ✓	6 marks
Availability of classes conducted in classrooms at department >50%and<75%	4 marks
Availability of classes conducted in classrooms at department >25%and<50%	2 marks
Availability of classes conducted in classrooms at department >10%and<25%	1 mark
Availability of Multimedia facility in classrooms>75%	4 marks
Availability of Multimedia facility in classrooms >50% and>75%✓	3 marks
Availability of Multimedia facility in classrooms >25% and>50%	2 marks
Availability of Multimedia facility in classrooms < 25%	1 mark

2. Availability of Laboratories in the Department:

Following are the laboratories with the described facilities in the department:

Sr. No.	Name of the Laboratory	Name of the Important equipment, Computing Facilities	Technical Manpower support		
			Name of Technical Staff	Designation	Qualification
1	Digital Signal Processing Laboratory/ PG Lab	Computers, Xilinx Foundation ISE software block with DSP graphical software, FPGA/CPCD development kit, FPGA trainer Kit	Sh. Ravinder Singh	Senior Technician	ITI, ECE
2	Advanced Communication Laboratory	Antenna Training kit, communication training kit, Workstation, DSO	Sh. Amarjit Singh	Senior Technician	B Tech

3	Servicing and maintenance Lab/ Industrial Electronics Lab	Mobile Telephone trainer kit, CRO trainer, UPS system trainer, home inverter system trainer, Workstation, power electronics industrial trainer,	Ms. Gurmeet Kaur	Senior Technician	Diploma in ECE
4	Microprocessor and Microcontroller Lab	Electronic workstation, Spectrum analyzer, universal microprocessor trainer kit, DSO	Sh. Partap Singh	Technician	Diploma in ECE/TV
5	Digital System Design/ Integrated circuits Lab	Workstation, DSO, IC Trainer Kit	Sh. Gurmit Singh	Senior Technician	Diploma in ECE
6	PCB Lab	Vertical processor, Camera, Workstation, PCB making machine	Sh. Ravinder Singh	Senior Technician	ITI
7	Microwave and Optical Communication lab	Microwave bench, attenuators, microwave sources, TaraNG Antenna trainer kits	Sh. Suman	Technician	ITI in General Electronics
8	Machine Vision and Motion control Lab	LabVIEW software, colour camera, Workstation	Sh. Gurmit Singh	Senior Technician	Diploma in ECE
9	Television Engineering Lab	CTV trainer, B&W trainer, VCD trainer, LED TV trainer, Microwave trainer, Washing machine trainer, Workstation, Audio amplifier	Sh. Vijay Prashar	Senior Technician	ITI in General Electronics
10	Basic Electronics Lab	Workstation, Multisim Software, DSO	Sh. Jujhar Singh	Technician	B.Tech
11	Computer Lab/Ph.D. Research Lab	PCs, MATLAB, IE3D, HFSS, COMSOL, Singular, OrCAD p-spice, Cadence	Sh. Vijay Prashar	Senior Technician	ITI in General Electronics
12	UG Project Lab	Universal programmer kit, Electronic test bench station	Sh. Partap Singh	Technician	Diploma in ECE/TV

13	Electromagnetic Testing and Measurement Lab/ Broadband Communication Lab	Anechoic chamber, VNA.	Sh. Jujhar Singh	Technician	B. Tech
14.	Opto Electronics Nano Devices Lab	OptiSystem 11, FEMSIM, OPTSIM, Vibrational Table, Optical Sensing Setup, OSA, OTDR Meter, PCF	Sh. Suman	Technician	ITI in General Electronics

Assessment rubrics

Laboratory space available/Laboratory space required to accommodate students' group ✓	2 marks
Equipment availability for routine classes ✓	2 marks
Equipment available for research purpose ✓	2 marks
Shortage of laboratories ✓	2 mark
Sizes of research labs ✓	1 mark
Space for pilot plant ✓	1 mark

3. Availability of Conference/Seminar Room, etc

Description	No. available	Capacity (no. of persons)	Remarks
No. of Seminar halls	01	80	sufficient as per strength
No. of Committee Rooms	01 (new block) +01 (old block)	40(new block), 25 (old block)	-
No. of smart class Room Lecture Hall	04 (new block) +01 (old block)	100 (new block), 60 (old block)	Can be used as seminar room as per the facilities available in these smart classrooms.

- Seminar Hall 'J C Bose Hall' (400 persons) / Mini auditorium CSE Block (120 persons)/ Main Auditorium (1200 persons) etc. centrally available at institute are also used by the department.

Assessment rubrics

Conference room availability (exclusive) at department ✓	3 marks
Seminar Hall (exclusive) at department ✓	3 marks
Capacity of the conference/ seminar halls >250 person	4 marks
Capacity of the conference/ seminar halls >100 and < 250 persons ✓	3 marks
Capacity of the conference/ seminar halls <100 person	2 marks

4. Availability of Seating Space for Faculty and Research Students

List of Faculty Rooms:

Sr. No.	Floor	Number of Faculty Rooms
1.	First Floor (Old Building)	07
2.	Second Floor (Old Building)	05
3.	First Floor (New Building)	06
4.	Second Floor (New Building)	06

Seating space of Research scholars is in their respective labs/workplace

Assessment rubrics

Adequate number of faculty rooms available (as per designation/ outside the labs) ✓	4 marks
Adequate sizes of faculty rooms ✓	3 marks
Adequate space available for research students ✓	3 marks

5. Availability of Internet Services in Research Labs and Classrooms

All smart classrooms are equipped with high-speed internet service through LAN (wired) and however other classrooms and Labs are connected through the Wi-Fi system available in the department

Assessment rubrics

Availability of wired LAN connections ✓	2 marks
Adequate Internet speed ✓	3 marks
Availability of wired LAN connections ✓	2 marks
Adequate Wi-Fi signal quality ✓	3 marks

6. Departmental Library and E-Resources

Departmental Library includes sufficient no. of text/ reference books (more than 1000 nos.) for catering to the regular need of the students/ staff/ faculty (for reading at library) other than the central library (Book bank/ Textbook section/ Reference book section/ Digital library). Apart from the books, the library has also a collection of Ph.D. and M.Tech theses, B.Tech and ICD project reports, and industrial training reports. The library has a reading area wherein the students and staff may go and read the study material.

Access to the e-resources is available with all students/ staff/ faculty through their login ID while at any place. A large no. of e-books, e-journals etc. has been subscribed by the institute.

Assessment rubrics

Availability of Books and e-resources with the department ✓	5 marks
Sufficiency of Computer and internet facility for access to e-resources ✓	3 marks
Adequate seating capacity of department library ✓	2 marks

7. Computing Facilities and Software

Computing Facilities available in computer/PhD research lab: The lab is equipped with the latest hardware & software. The computer laboratories provide a computing environment (Linux and Windows Platforms) to the students and faculty to pursue academic excellence. The various software is catering to students such as MATLAB, MS office, etc. The computer laboratories are equipped with high-end printers and scanners. All servers, PCs and peripherals are connected to the campus-networking for sharing the resources. Wi-Fi facility is available in the departments.

The list of pcs and software available in the ECE Department is as below-

1.	PCs (Linux based)	10	8GB RAM, 1 TB HDD.
2.	PCs (Linux based)	3	32GB RAM, 1 TB SSD.
3.	PCs (Windows based)	56	8/16GB RAM, 1 TB HDD.
4.	PCs (Windows based)	1	32GB RAM, 1 TB SSD.
5.	Workstation	4	32GB,64GB,128GB RAM, 1 TB HDD.
6.	Server	1	8GB RAM.

Software available	Utilization
Cadence and H-spice	Ph.D. and PG students are utilized this software for design and analysis of analog and digital VLSI circuits.
Opti-System 11.0, FEMSIM, OPTSIM	Ph.D. and M.Tech students work on this software for research on Optics.
HFSS, IE3D, TeraNG and COMSOL	Ph.D. and PG students are utilized this software for design and analysis of electromagnetic devices.
Matlab, Labview software, Multisim Software	For design of various electronics circuit to implement various electronics projects.

Assessment rubrics

Adequate availability of software ✓	5 marks
Adequate number and configuration of computers ✓	3 marks
Adequate lab space and allied services availability ✓	2 marks

8. Adequacy of Offices and Furnishing for Faculty

Sufficient office rooms for faculty are available with necessary furnishing requirements. However, some of the office rooms on the top floor need false ceiling to solve the problem faced during summer and further procurement of furniture is also needed to meet the requirements.

Assessment rubrics

Adequate number of faculty rooms available (as per designation/ outside the labs) ✓	2 marks
Sizes of faculty rooms ✓	3 marks
Furnishing of the room ✓	5 marks

9. Faculty- Student Ratio

Total no. of students in dept. (sanctioned ICD/B.E./M.E.) = **290** nos.
(excluding 1st year students as considered for subjects of other departments)

No. of Faculty Members in dept.:

Professor – 06 nos.
Associate Prof. – 00 nos.
Asst. Prof. – 07 nos.
Guest faculty – 02 nos.

Faculty – student Ratio of Department of ECE, SLIET during 2022-23 is found to be **1:19.3** that needs to be improved.

Assessment rubrics

Faculty student ratio $\leq 1:15$	10 marks
Faculty student ratio $> 1:15$ and $< 1:20$ ✓	8 marks
Faculty student ratio $> 1:20$ and $< 1:25$	6 marks

10. Support Staff (Technical/Administrative) Adequacy

No. of Technicians/ Sr. Technicians (Regular) – 09 nos.
No. of Technicians (on Contract) – 00 nos.
No. of Lab Attendant – 00 no.
Administrative staff (Clerk/ MTS) – 02 nos. (Clerk 01, MTS 01)

Assessment rubrics

Adequate technical staff / lab > 1	5 marks
Adequate technical staff / lab $= 1$ ✓	4 marks
Adequate technical staff / lab < 1	3 marks
Adequate Technical Staff on regular basis ✓	3 marks
Adequate Admin. Staff on regular basis ✓	2 marks

D. OUTCOMES

1. Placement

(i) ICD students (ii) UG students (iii) PG students (iv) Ph. D. students

- I. More than 50% of ICD students are promoted to B.Tech degree
- II. 33 students out of 66 students' of 2019 batch are placed/enrolled in higher studies .
- III. There are 4 M.Tech students, 1 student has gone for higher study (For PhD in IIT Delhi).
- IV. Ph.D. students have gone for an academic carrier in various colleges and other private universities.

Assessment rubrics

Placement %age/higher studies for ICD $> 80\%$	2 marks
Placement %age/higher studies for ICD $> 50\%$ and $< 80\%$ ✓	1.5 marks
Placement %age/higher studies for ICD $\geq 30\%$ and $< 50\%$	1 mark
Placement %age/higher studies for ICD $< 30\%$	0.5 mark
Placement %age/higher studies for UG $> 80\%$	4 marks
Placement %age/higher studies for UG $> 50\%$ and $< 80\%$ ✓	3 marks

Placement %age/higher studies for UG $\geq 30\%$ and $< 50\%$	2 marks
Placement %age/higher studies for UG $< 30\%$	1 marks
Placement %age/higher studies for PG $> 80\%$	2 marks
Placement %age/higher studies for PG $> 50\%$ and $< 80\%$	1.5 marks
Placement %age/higher studies for PG $\geq 30\%$ and $< 50\%$	1 mark
Placement %age/higher studies for PG $< 30\%$ ✓	0.5 mark
Placement %age/higher studies for Ph.D. $> 80\%$ ✓	2 marks
Placement %age/higher studies for Ph.D. $> 50\%$ and $< 80\%$	1.5 marks
Placement %age/higher studies for Ph.D. $\geq 30\%$ and $< 50\%$	1 mark
Placement %age/higher studies for Ph.D. $\geq 1\%$ and $< 30\%$	0.5 mark

2. Average Number of Ph. Ds awarded per year

1.	Mukesh Kumar	Enrolment date 28.07.2015 Defence date 02.08.2021
2.	Ashwani Kumar	Enrolment date 22.07.2016 Defence date 12.11.2021
3.	Sandeep Kohar	Enrolment date 18.02.2013 Defence date 07.03.2022
4.	Amit Shakya	Enrolment date 06/08/2018 Defence date 25/11/2022
5.	Rajeev Kumar	Enrolment date 14/08/2017 Defence date 08/09/ 2022
6.	Vishal Sharma	Enrolment date 06/08/2018 Defence date 01/12/2022
7.	Sarbjeet Singh	Enrolment date 30/01/2015 Defence date 12/12/2022
8.	Amandeep Kaur	Enrolment date 14/08/2017 Defence date 18/10/2022
9.	Alka Singla	Enrolment date 18/07/2016 Defence date 01/06/2023
10.	Ayushman Ramola	Enrolment date 22/07/2019 Defence date 19/06/2023

Assessment rubrics

Number of Ph.D. defence in an academic year = 3 ✓	07 Marks
Number of Ph.D. defence in an academic year = 2	05 marks
Number of Ph.D. defence in an academic year = 1	03 marks
Number of Ph.D. submitted apart from defence in an academic year ≥ 2 ✓	04 marks
Number of Ph.D. submitted apart from defence in a academic year = 1	02 marks

(Limited to maximum 10 marks)

3. Publications per Faculty in Indexed Journals/Year (Average of last three years)

Publication list given above

Assessment rubrics

Average Number of publications/faculty in last academic year ≥ 2 ✓	10 Marks
Average Number of publications/faculty in last academic year ≥ 1.5 and < 2	08 Marks
Average Number of publications/faculty in last academic year ≥ 1 and < 1.5	06 Marks
Average Number of publications/faculty in last academic year ≥ 0.5 and < 1	04 Marks

Average Number of publications/faculty in last academic year ≥ 0.1
and < 0.5

02 Marks

4. Average Citations per Faculty/Year (Last-Three Years) (Web of Science/Scopus)

Faculty	Designation	Citations	h-Index
Dr. A. P. Singh Pharwaha	Professor	Google Scholar 2055	19
Dr. Anupma Marwaha	Professor	Google Scholar 1168	17
Dr. Surinder Singh	Professor	Google Scholar 2050	26
Dr. J.S. Ubhi	Professor	Google Scholar 429	10
Dr. Dilip Kumar	Professor	Google Scholar 3210	27
Dr. Ajay Pal Singh	Professor	Google Scholar 212	7
Er. Pankaj Kumar Das	Assistant Professor	Google Scholar 110	5
Er Vivek Harshey	Assistant Professor	Google Scholar 04	2
Er Vipul Singhal	Assistant Professor	Google Scholar 10	1
Dr Kundan Kumar	Assistant Professor	Google Scholar 271	8
Dr Amandeep Kaur	Assistant Professor	Google Scholar 67	4
Dr Vishal Sharma	Assistant Professor	Google Scholar 63	6
Dr Sarbjeet Singh	Assistant Professor	Google Scholar 20	2
Total Citations		9649	
Average Citation per faculty per year		≈ 160	

Assessment rubrics

Average Number of citations/faculty in last academic year ≥ 25 ✓	10 Marks
Average Number of citations/faculty in last academic year ≥ 20 and < 25	08 Marks
Average Number of citations/faculty in last academic year ≥ 15 and < 20	06 Marks
Average Number of citations/faculty in last academic year ≥ 10 and < 15	04 Marks
Average Number of citations/faculty in last academic year ≥ 5 and < 10	02 Marks

5. Recognitions; Awards (National/International) to Faculty/Students

S. No.	Name	Award
1.	Dr. Surinder Singh	1. Distinguished scientist award (top 2%) 2. Shastri Publication Grant (SPG) award

2.	Dr. Dilip Kumar	1. Distinguished scientist award (top 2%)
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Assessment rubrics

Total number of awards in an academic year ≥ 5	10 Marks
Total number of awards in an academic year ≥ 4 and < 5	08 Marks
Total number of awards in an academic year ≥ 3 and < 4	06 Marks
Total number of awards in an academic year ≥ 2 and < 3 ✓	04 Marks
Total number of awards in an academic year ≥ 1 and < 2	02 Marks

1. Consultancy and Externally Funded Projects

Dr. Surinder Singh

1. Shastri Publication Grant (SPG) award, **Rs. 1,00,000**
2. Design of High-speed Multichannel Optical wireless communication system based on hybrid WDM Free Space Optics Transmission link for MIMO applications, sponsored under Teachers associate for research excellence (TARE) funded by SERB-New Delhi, **Rs. 18,30,000/-**

Assessment rubrics

Project amounting to \geq INR 50 lakhs ✓	10 marks
Project amounting to INR 40-50 lakhs	9 marks
Project amounting to INR 30-40 lakhs	8 marks
Project amounting to INR 20-30 lakhs	7 marks
Project amounting to INR 10-20 lakhs	6 marks
Project amounting to INR 5-10 lakhs	5 marks
Project amounting to $<$ INR 5 lakhs	4 marks

7. Number of Ph.D. graduates who took Academics as Career (Last 5 Years)

S.No.	Name of Scholar	Guide name
1.	Surekha Rani	Dr. Anupma Marwaha
2.	Ashwini Kumar	Dr. A. P. Singh
3.	Tarunpreet Kaur	Dr. Dilip Kumar
4.	Dr. Veerpal Kaur	Dr. Surinder Singh
5.	Dr. Mukesh Kumar	Dr. J. S. Ubhi
6.	Dr. Ashish Kumar	Dr. A. P. Singh
7.	Dr. Gurmeet Singh	Dr. A. P. Singh
8.	Dr. Dilbag Singh	Dr. Surinder Singh
9.	Dr. Sukhbir Singh	Dr. Surinder Singh

10.	Dr. Taranjeet Kaur	Dr. Surinder Singh
11.	Dr. Candy Goyal	Dr. J. S. Ubhi
12.	Amit Shakya	Dr. Surinder Singh
13.	Rajeev Kumar	Prof. Ajay Pal Singh
14.	Vishal Sharma	Dr. Surinder Singh
15.	Sarbjee Singh	Dr. Dilip Kumar
16.	Amandeep Kaur	Prof. Ajay Pal Singh
17.	Alka Singla	Dr. Anupma Marwaha

Assessment rubrics

Number of students took Academics as Career ≥ 5 ✓	10 Marks
Number of students took Academics as Career ≥ 4 and < 5	08 Marks
Number of students took Academics as Career ≥ 3 and < 4	06 Marks
Number of students took Academics as Career ≥ 2 and < 3	04 Marks
Number of students took Academics as Career = 1	02 Marks

8. Students offered for higher studies

Assessment rubrics

% of students opted for higher studies in a academic year ≥ 20	10 Marks
% of students opted for higher studies in a academic year ≥ 15 and < 20	08 Marks
% of students opted for higher studies in a academic year ≥ 10 and < 15	06 Marks
% of students opted for higher studies in a academic year ≥ 5 and < 10 ✓	04 Marks
% of students opted for higher studies in a academic year ≥ 0.1 and < 5	02 marks

9. Number of qualified students NET/GATE/CAT etc

Number of gate qualified students are 5.

Assessment rubrics

% of students qualified GATE in a academic year ≥ 20	10 Marks
% of students qualified GATE in a academic year ≥ 15 and < 20	08 Marks
% of students qualified GATE in a academic year ≥ 10 and < 15	06 Marks
% of students qualified GATE in an academic year ≥ 5 and < 10 ✓	04 Marks
% of students qualified GATE in an academic year ≥ 0.1 and < 5	02 marks

9. Entrepreneurship

Nil

Assessment rubrics

% of students opted for entrepreneurship in an academic year ≥ 20	10 Marks
% of students opted for entrepreneurship in an academic year ≥ 15 and < 20	08 Marks
% of students opted for entrepreneurship in an academic year ≥ 10 and < 15	06 Marks
% of students opted for entrepreneurship in an academic year ≥ 5 and < 10	04 Marks
% of students opted for entrepreneurship in an academic year ≥ 0.1 and < 5	02 Marks
✓	

The calculations of STR and faculty status be done as per the following Table

Program me	Sanctioned Strength	Admitted Students		Duration of Programme	Total Students	STR (as per AICTE)
		1 st year	2 nd year			
ICD	19(CSME)+18 (CTV)=37	1 st year	19+18	3-years	106	290/15= 19.33
		2 nd year	17+18			
		3 rd year	18+16			
UG	60 (from 2nd year onwards)	1 st year	30	4 years	30	
		2 nd year	72	3 years	200	
		3 rd year	67			
		4 th year	61			
PG	18	1 st year	4	2 years	7	
		2 nd year	3			
Total (ICD strength					106)	
Total (UG strength					230)	
Total (PG strength					7)	

Table-2: Teaching Load of Department

Programme	Odd Semester				Even Semester			
	L	T	P	Total	L	T	P	Total
ICD	25	7	26	58	32	4	38	74
OICD	18	0	22	40	3	0	2	5
UG	59	14	36	109	37	5	32	74
OUG	6	0	10	16	4	0	8	12
PG	18	0	8	26	12	1	10	23
Total	126	21	102	249	88	10	90	188

Note: OICD means ICD programme of other departments
OUG means UG programme of other departments

Table 3: Faculty in the department

Teaching load in hours / week		Teaching load to be allocated (A)	Teaching load to Guest Faculty (B)	Teaching load to Research Scholar (C)	Total Load (A)+(B)+(C)
Odd Semester	Even semester				
249	188	378	48	40 (on sharing basis)	426
Total: 437 hours					Balance: 11 hours (Requirements of 1 additional faculty)

Notes:

1. While calculating the teaching load, the project load is not considered as project is offered group wise to the teachers.
2. For theory classes, one group of students in the range of 60 to 80, be considered.
3. For practical (laboratory) classes, one group of students in the range of 30 to 35, be considered.
4. Similarly, for tutorial classes, one group of students in the range of 30 to 35, be considered.