

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

**DEPARTMENT OF ECE**

Ref. No: SLUET/2021/5030

Date: 21/9/22

From : HOD (ECE) SSS

To : Dean (Academic) 22.9.2022

Subject : **Academic Audit for the Academic year 2021-22 report.**

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With refence to your letter No. Dean(A)/2021/352 dated 19.05.2022, regarding the Academic audit report of SLIET for the Academic year 2021-22. The Academic Audit 2021-22 has been completed. Please find enclosed herewith the report.

[Signature]  
HOD (ECE)

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

**ACADEMIC AUDIT (2021 - 2022)**  
**PROFORMA OF ASSESSMENT**

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

**Reviewer (Name, Designation & Address):** Dr. Surinder Singh, HOD (ECE)-Convener

Dr. J.S Dhillon, Dean (Academics)

Dr. Anupma Marwaha, Professor (ECE)

Prof. D.C. Saxena (Food Engineering and Tech.)

Prof. P.K. Jain (Management and Humanities)

**External Expert:**

Prof. Arun K. Khosla, Department of ECE, NIT, Jalandhar

**2. Date of Review: 07.09.2022**

**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	7
3.	Formal Academic Load on Students [Teaching, Laboratory/Practical, Projects(minor/major)]	10	9
4.	Evaluation Process (Continuing Evaluation, and End-Term Evaluation)	8	8
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	8

(Prof Arun Khosla)  
NIT, Jalandhar

(P.K. Jain)

(Surinder Singh)

(Prof. D.C. Saxena)  
F&T, SLIST

(Prof J.S. Dhillon)

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	8
<b>Total Score (out of 100)</b>		76	71
<b>A.2</b>	<b>UG Programme</b>	<b>Score</b>	
		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	10	8
3.	Relevance of contents of courses taught to the students and scope of improvement (revision of syllabus, addition of new experiments)	10	8
4.	Formal academic load on students [Teaching, Laboratory/Practical, Projects(minor/major)]	10	9
5.	Modern teaching methods in practice other than the conventional methods E-Assisted Learning (i) Availability of Library Resources (ii) Multi-Media Assisted Teaching	8	8
6.	Evaluation Process (Continuing Evaluation, and End-Term Evaluation) (i) Theory and tutorial (ii) Practical (case studies)	8	8
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	6	5
9.	(a) Effectiveness of Assisted Learning in Tutorial classes/seminars for Students	8	7
	(b) Faculty Mentoring/Faculty Advisor System for Students/Class of Students		
10.	Placement %age/higher studies options (last three years)	8	8
<b>Total Score (out of 100)</b>		86	77
<b>A.3</b>	<b>PG Programme (Separate for each programme)</b>	<b>Score</b>	
		Self-assessment	Expert assessment
1.	Curriculum (Structure, Course Syllabi, Flexibility)	10	9
2.	Formal Academic Load on Students [Teaching, Laboratory/Practical, Projects(minor/major)]	10	8

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Academic Audit Proforma of Assessment

3.	Evaluation Process (Continuing Evaluation, and End-Term Evaluation)	8	9
4.	Relevance of contents of courses taught to the students and scope of improvement	8	7
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	8
10.	Monitoring and continuous evaluation of the project work assigned to the students (mechanism)	10	8
<b>Total Score (out of 100)</b>		84	75

A. 4	Doctoral (Ph.D.) Programmes	Score	
		Self-assessment	Expert assessment
1.	Intake of Ph.D. Students	8	8
2.	Admission Process	8	8
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	9
6.	Research Facilities available in the Department	8	8
7.	Average No. of Research Students/Faculty	4	4
8.	Average No. of Research Papers of Ph. D. Students (Indexed Journals)	8	6
9.	Average Duration to Complete Ph.D. (years)	4	4
10.	Participation of Research Scholars in Conferences/Workshops	4	4
<b>Total Score (out of 100)</b>		70	67

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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	3+3+3=9	9
4.	Quality of Research	9	8
5.	Collaborations with other departments (within the institute) and at National, and International levels.	10	7
6.	Impact and Quality of Publications	10	9
7.	Relevance of Research to Knowledge Generation and Social Relevance	9	8
8.	Student Exposure for Attending Quality Conferences/Symposia	8	8
9.	Inter departmental collaborations	10	7
0.	Industry/externally funded sponsored research (Numbers and amount)	10	8
<b>Total Score (out of 100)</b>		92	78

General Comments on,

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 or scientists from National/International laboratories or institutes on latest developments in the subject.
- Organizing seminars, workshops and conferences for faculty and students.

**Action Plan (Student Mentoring)**

- Help the students to lower stress and build confidence through effective counselling.
- Tailor mentoring style and content to the student to overcome differences based on factors including culture, ethnicity, gender, social background.
- Impart career guidance through an interpersonal engagement by sharing experience and expertise.
- **Constructive interaction with a mentor and participation in collective activities.**

**Short term goals**

- To upgrade laboratories and teaching learning infrastructure.
- Technical Knowledge/skills upgradation of faculty and staff.



**Long term goals**

- 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 one JRF Dr Sukhbir Singh have been recognized as top 2% scientist in the world as per Stanford University survey.

**Also, the department has been awarded with NBA accreditation for three years.**

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

2019-20: 34  
2020-21: 57  
2021-22: 33

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

3. 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.

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.

4. 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.

5. Technical Societies/ Colloquium for Students
  - (i) Departmental Society
  - (ii) Student Chapter(s) of Professional Societies

6. Scope of improvement in the presenting teaching –learning process

The skill and expertise of the faculty/Technical staff in the department (specific)  
The rapid changes and increased complexity of today's world present new challenges and put new demands on our education system. There has been generally a growing awareness of the necessity to change and improve the preparation of students for

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productive functioning in the continually changing and highly demanding environment. In confronting this challenge, it is necessary to consider the complexity of the education system itself and the multitude of problems that must be addressed

- Adapting teaching to different student characteristics by using diverse methods of teaching. Adaptation to the ability levels, patterns of different abilities, learning styles, personality characteristics, and cultural backgrounds.

Integrating the curriculum by developing inter-disciplinary curriculum units that enable students to acquire knowledge from different disciplines through a unifying theme while having the opportunity to contribute in different and special ways to the objectives of the integrated units.

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

To augment the existing lab infrastructure new hardware and software equipment's are procured time to time. Recently TaraNG software for UG and PG students have been purchased. 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.

8. Any other point

### C. Departmental Infrastructure

C. 1	Departmental resources	Score	
		Self-assessment	Expert assessment
1	Adequacy of Class Rooms and Multi-Media Facility	10	10
2	Availability of Laboratories	9	9
3	Availability of Conference/Seminar Room, etc	9	9
4	Availability of Seating Space for Faculty and Research Students	10	9
5	Availability of Internet Services in Research Labs and Class Rooms	10	9
6	Departmental Library and E-Resources	10	9
7	Computing Facilities and Software	9	9
8	Adequacy of Offices and Furnishing for Faculty	8	8
9	Faculty- Student Ratio	6	5
10	Support Staff (Technical/Administrative) Adequacy	10	9
<b>Total Score (out of 100)</b>		<b>91</b>	<b>86</b>

SWOT analysis by the department  
Strengths:

*[Handwritten signatures and marks]*



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 in the Department.

**Weaknesses:**

1. Limited bondage between Department & Industry for accessing Industrial needs.
2. Limited Industrial visits.
3. Student- Faculty ratio.
4. Less admissions in courses ICD, UG and Ph.D.

**Opportunities:**

1. To procure equipment for ICD, UG and PG laboratories as per new scheme.
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 Programs

**Suggestions for improvement:**

1. Industry oriented subjects must be included in model curriculum.
2. Sustainability for industry relationship.
3. More industry persons must be involved in BOS.
4. More collaboration with other departments.
5. Special sessions for improvement in soft skills of students.

**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	8	7
2	Average No. of Ph. Ds Awarded per Year	10	8
3	Publications per Faculty in Indexed Journals/Year (Average of last three years)	10	8
4	Average Citations per Faculty/Year (Last-Three Years) (Web of Science/Scopus)	10	8





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**LONOGOWAL-148106**

**ACADEMIC AUDIT (2021 - 2022)**  
**SUMMARY SHEET**

1.	Name of the Department	Electronics and Communication Engineering	
2.	Name of Reviewer Designation & Address	<b>From Academia</b>	<b>From Industry</b>
		Dr. Surinder Singh, HOD (ECE)- Convener Dr. J.S Dhillon, Dean (Academics) Dr. Anupma Marwaha, Professor (ECE) Prof. D.C. Saxena (Food Engineering and Technology) Prof. P.K. Jain (Management and Humanities) <b>External Expert:</b> Prof. Arun K. Khosla, Department of ECE, NIT, Jalandhar	
3.	Date of Meeting	07.09.2022	

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)				
76	86	84	70	92	91	72	571
71	77	75	67	78	86	62	516

**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.

Name & Signature of HOD

*Surinder Singh*



## 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 shall consist of approximately 142 credits including lectures, tutorials, practical and design work, project work, and special academic activities like in-house summer training, industrial training etc. 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. In addition, the SLIET system offers two exist mode: first after completing two-year (by taking certificate) and another one after completion of full course (by taking diploma).

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
<b>Total</b>			<b>19</b>	<b>1</b>	<b>12</b>	<b>32</b>	<b>26</b>
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
<b>Total</b>			<b>15</b>	<b>1</b>	<b>16</b>	<b>32</b>	<b>24</b>
Semester-III (A)							
	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

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Total			14	3	12	29	22
<b>Semester-IV</b>							
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
<b>Total</b>			<b>14</b>	<b>3</b>	<b>14</b>	<b>31</b>	<b>24</b>
<b>Semester-V(A)</b>							
	TP301	Four Weeks Industrial Training during summer vacations				160	
<b>Semester-V (B)</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
<b>Total</b>			<b>15</b>	<b>3</b>	<b>10</b>	<b>38</b>	<b>23</b>
<b>Semester-VI</b>							
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
<b>Total</b>			<b>15</b>	<b>2</b>	<b>12</b>	<b>29</b>	<b>23</b>
<b>Total Theory &amp; Practical Load for Diploma</b>			<b>92</b>	<b>13</b>	<b>76</b>	<b>181</b>	<b>142</b>
<b>Note:</b>	The required credits for certificate programme						<b>96</b>
	The required credits for ICD programme						<b>142</b>
	Maximum courses in one semester						<b>7</b>
	Maximum Contact Hrs.						<b>32</b>
	The common courses and their credits are fixed for all ICD programmes.						
<b>Courses offered to other Departments:</b>							
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



**Course Syllabi:** A course syllabus is an academic document that communicate information about the specific course. At SLJET Longowal course syllabus may be set out by respective departmental professor who supervises, or controls course qualities and is recommended by board of studies (BOS). The board of studies (BOS) have some internal members like Head of department, professor, Associate professor, and Assistant professor (having doctorate) and external member like professor from other institute, experts from industries, alumni, parents etc. Finally, shall have the approval of the Senate. In general, the departments will prepare the syllabus of each subject containing the scope of studies and instructions to be imparted which must have the approval of the Senate. The detailed syllabus is enclosed.

**Flexibility:** The SLJET system offers two exist mode: first after completing two-year (by taking certificate) and another one after completion of full course (by taking diploma).

**Theory/Practical:** To make the time-table simple and easily implementable, the variety of course volume has been limited to only three types – (3-0-0) 3 credits, (3-1-0) 4 credits and (0-0-4) 2 credits. The total teaching duration in a week is divided into several “slots” in the timetable. Moreover, the five to seven days have generally provided at the last of each semester to facilitate the student to extra classes.

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

**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**

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, keeping in view the latest industry trends and market requirements in all major diploma in engineering & technology subjects and be made available to all universities / board of technical education and diploma institutions in the country.

Keeping in view the AICTE model curriculum, Department of electronics and communication engineering prepared a curriculum for ICD program with approximately total 142 credit and then approved by Senate. The curriculum is at par with AICTE model curriculum.

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

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### 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 student per semester are given below

Semester	Theory (hr)	Tutorial (hr)	Laboratory (hr)	Projects (hr)	Credit Point
1 <sup>st</sup>	19	1	12	00	26
2 <sup>nd</sup>	15	1	16	00	24
3 <sup>rd</sup>	14	3	12	00	22
4 <sup>th</sup>	14	3	14	00	24
5 <sup>th</sup>	15	3	10	00	23
6 <sup>th</sup>	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.

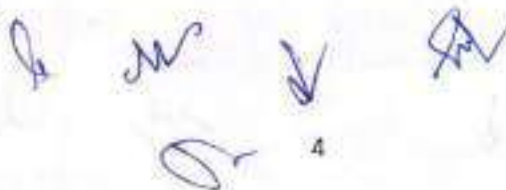
#### • Continuous Assessment Examination (CAE) in Theory Courses.

- There will be 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 (10% weightage) each per semester are required to check his/her involvement in the course.
- Faculty may give attendance marks within this 05% weightage with prior information in starting of course.

#### • End Term Examination (ETE) for Theory Courses

The structure of the question paper shall be as under: -

- The question paper shall have three sections and students to attempt five questions which carry equal marks, with weightage shall be given to the numerical type problems, wherever possible.





(b) Section-I will have one compulsory question of short answer type questions covering whole syllabus. Section-II and Section-III shall contain three questions covering the entire course syllabus and the students need to attempt two questions from each section.

**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 will be continuous assessment of the student in term of practical records, oral viva at 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 structure of the question paper shall be as under: -

- (a) The question paper shall have name of one already performed experiment. The students must be written all the segment 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. All the components have 50% (out of 40) weightage in the total marks for external evaluation.
- (b) The remaining 50% (out of 40) will be earn based on oral viva based on experiment performed during the final examination.

**The Overall Evaluation (Distribution of Grade)**

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

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

**The overall grading will be 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			

**Remarks:** Continuous teacher-based assessment grading criteria is done through assignment work.

**Assessment rubrics**

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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 term 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 have to perform two-week practical training (TP-201) after 2<sup>nd</sup> semester and four-week industrial training (TP-301) after 4<sup>th</sup> semester. However, COVID-19 pandemic situation has forced the students to work from home. In such a scenario it will not be possible for students to undergo Summer Training in normal fashion as per past practice. So, in view of giving our student to complete course requirement, it is proposed to give suitable exercise to cover the said aspect of course. In this exercise, each student is expected to write a report in given format for the given exercise. The report should be submitted in PDF format to designated email id in case submission does not fall in the period of institute working, otherwise a bound report is to be 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 are available at institute website.

#### Assessment rubrics

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

#### 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 members.

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

6



4

10	Quiz-II
11	Major End Exam
12	Results Copy

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**Exercise in lieu of In-house Training of ICD First Year Students (CSME/ CTV-DEC-2019) in 2020**

**Faculty Coordinator: Vipul Singhal**

S. No	Exercise	How to write
1	Identify the suitable opportunities for ICD (Electronics) in i. Employment (Industry/service sector) ii. Self-Employment (Start-up/business opportunity / setting up of small plant) iii. Higher studies	<b>Suggested Sources of Information-</b> a. <a href="https://bharatskills.gov.in/">https://bharatskills.gov.in/</a> (Electronic Mechanic, Trade Theory) b. Curriculum for (Electronics and Hardware Sector) By Skill Development Ministry, Government of India. c. <a href="https://youtu.be/6Maq51yHSuc">https://youtu.be/6Maq51yHSuc</a> d. <a href="https://www.youtube.com/watch?v=4sBgu_fUpil">https://www.youtube.com/watch?v=4sBgu_fUpil</a> e. <a href="https://www.youtube.com/watch?v=iHmSj6v7LOE">https://www.youtube.com/watch?v=iHmSj6v7LOE</a> <b>Report Writing –</b> Give bullet points for each with possible applications of Tools, Components and Instruments.
2	Explain <b>any two</b> topics from the topics suggested below. 1. Application of ammeter for current measurement, 2. Application of voltmeter for voltage measurement, 3. CRO-Wave form display, time base, measurement of voltage, measurement of frequency and phase by CRO, dual trace oscilloscope. (Any two topics under CRO) 4. How to use digital Multimeter? 5. How to Test Capacitors with and without using Multimeter? 6. How to identify the resistor wattage (Both fixed & variable resistors)? 7. How to test diode using digital Multimeter? 8. How to Test the Voltage of Zener Diode without variable DC power supply? 9. What are the different electronic circuit simulations Software? 10. Soldering practices-surface mount technology, Introduction to solder paste(flux), Soldering of SM	<b>Suggested Sources of Information-</b> a. <a href="https://en.wikipedia.org/wiki/Ammeter">https://en.wikipedia.org/wiki/Ammeter</a> b. <a href="https://circuitglobe.com/ammeter.html">https://circuitglobe.com/ammeter.html</a> c. <a href="https://www.youtube.com/watch?v=Z_9GldZp9dE">https://www.youtube.com/watch?v=Z_9GldZp9dE</a> d. <a href="https://www.youtube.com/watch?v=8YRJ6F5N9xQ">https://www.youtube.com/watch?v=8YRJ6F5N9xQ</a> e. <a href="https://www.youtube.com/watch?v=O2ba-t_N1gE">https://www.youtube.com/watch?v=O2ba-t_N1gE</a> f. <a href="https://www.youtube.com/watch?v=J8xPvPnSk9Y">https://www.youtube.com/watch?v=J8xPvPnSk9Y</a> g. Textbooks h. Google the relevant topic. <b>Report Writing –</b> Definition, Procedure, how to connect in circuit? Different Types, Applications, Important specifications, Give bullet points for each topic. <b>Note-</b> Two topics will be given by Training Coordinator to each student.

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<p>assemblies - Reflow soldering, Printed Circuit Board.</p> <p>11. What are the various multimedia systems useful for online as well as classroom teaching.</p>	
<p>3 Your idea of maintaining physical distance in a triple seated Hostel.</p> <p>What are the various symptoms of COVID-19? What are the preventive measures?</p>	<p><b>Suggested Sources of Information-</b></p> <p>a. <a href="https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html">https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html</a></p> <p>b. <a href="https://www.mohfw.gov.in/pdf/SocialDistancingAdvicebyMOHFW.pdf">https://www.mohfw.gov.in/pdf/SocialDistancingAdvicebyMOHFW.pdf</a></p> <p>c. <a href="https://www.who.int/">https://www.who.int/</a></p> <p><b>Report Writing –</b> Identify touch points in room, corridor, Mess, Common Places, suggest methods to minimize the touch at least at five places, Google the relevant topic.</p>
<p><b>Guidelines for report preparation-</b> Front page- Project Name, Student Name, Course, Registration No, Department Name, Institute Name and address followed by –Report on S no 1, 2&amp;3 as suggested above, each section to start with new page, (<b>Report must be written in your own handwriting, then take photo or scan of the report and must be sent to training coordinator.</b>)</p>	

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**Department of Electronics and Communication Engineering**  
**Sant Longowal Institute of Engineering & Technology**  
**Exercise in Lieu of Industrial Training of ICD Second Year (ICD-CSME/CTV-2018) 4 Weeks duration in 2020**  
**Faculty Coordinator (Summer Training): Er. Vivek Harshey**

**Exercise in lieu of Industrial Training of ICD second Year Students (CSME/CTV-DEC-2018)**

S. No.	Exercise	How to write
1.	Identify the suitable opportunities for ICD (instrumentation) in i. Employment (Industry/service sector) ii. Self-Employment (Start-up/business opportunity / setting up of small plant). iii. Higher studies.	<b>Suggested Sources of Information-</b> a. <a href="https://bharatskills.gov.in/">https://bharatskills.gov.in/</a> (Electronic Mechanic, Trade Theory) b. Curriculum for (Electronics and Hardware Sector) By Skill Development Ministry, Government of India. c. <a href="https://youtu.be/6Maq51yHSuc">https://youtu.be/6Maq51yHSuc</a> d. <a href="https://mhrd.gov.in/higher_education">https://mhrd.gov.in/higher_education</a> e. <a href="https://www.studyinindia.gov.in/planyourstudies/indian_education">https://www.studyinindia.gov.in/planyourstudies/indian_education</a> f. Google the relevant topic. <b>Report Writing –</b> Give names of industries along with application of domain knowledge, Self-employment opportunities, Options for Higher studies.
2.	Write a report on any one of following- i. Any Electronics industry ii. Use of Electronics in Health care iii. Research Laboratories in Electronics and Communication in India iv. 4G mobile technology v. Arduino technology and applications. vi. Robotics and its application.	<b>Suggested Sources of Information -</b> a. <a href="https://www.youtube.com/watch?v=QdEmoeDjIko">https://www.youtube.com/watch?v=QdEmoeDjIko</a> b. <a href="https://www.youtube.com/watch?v=Z_9GldZp9dE">https://www.youtube.com/watch?v=Z_9GldZp9dE</a> c. <a href="https://www.youtube.com/watch?v=8YRJ6F5NpxQ">https://www.youtube.com/watch?v=8YRJ6F5NpxQ</a> d. <a href="https://www.youtube.com/watch?v=O2ba-t_NlgE">https://www.youtube.com/watch?v=O2ba-t_NlgE</a> e. <a href="https://www.youtube.com/watch?v=J8xPvPnSk9Y">https://www.youtube.com/watch?v=J8xPvPnSk9Y</a> f. Textbooks g. Google the relevant topic. <b>Report Writing –</b> Definition, Procedure, Different Types, Applications, Important specifications, Give bullet points for each topic.  <b>Note-</b> The topic will be given by Training Coordinator to each student.

Q Q ch Sub d



3.	<p>Your idea of maintaining physical distance in a triple seated Hostel.</p> <p>What are the various symptoms of COVID-19? What are the preventive measures?</p>	<p><b>Suggested Sources of Information-</b></p> <p>a. <a href="https://www.edc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html">https://www.edc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html</a></p> <p>b. <a href="https://www.mohfw.gov.in/pdf/SocialDistancingAdvisorybyMOHFW.pdf">https://www.mohfw.gov.in/pdf/SocialDistancingAdvisorybyMOHFW.pdf</a></p> <p>c. <a href="https://www.who.int/">https://www.who.int/</a></p> <p><b>Report Writing –</b> Identify touch points in room, corridor, Mess, Common Places, suggest methods to minimize the touch at least at five places, Google the relevant topic.</p>
<p><b>Guidelines for report preparation-</b> Front page- Project Name, Student Name, Course, Registration No, Department Name, Institute Name and address Followed by –Report on S no 1, 2 &amp; 3 as suggested above, each section to start with new page, (Report must be written in your own handwriting, then take photo or scan of the report and must be sent to training coordinator.)</p>		

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**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.

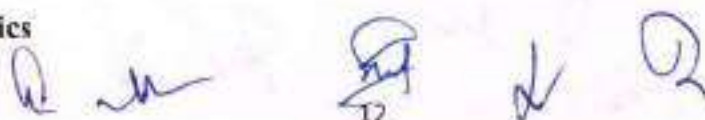
Role of class counselor: it is expected from the counsellor to ensure that the student remains disciplined and motivated in class. Moreover, counsellors provided the following for students:

1. **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.
2. **Career and Vocational Guidance:** counsellors can guide the students in choosing the right career based on suitable opportunities.
3. **Issues with Peers:** the class counsellor plays an important role to see how the teachers, administration and parents interacted to either mediate or exacerbate the situation as well as how it was developmentally crucial to resolve the issues.
4. **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.
5. **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.
6. **Working with Teachers:** Teacher meetings are extremely crucial to ensure two basic things 1) 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 2) help the teacher manage his own workload, by providing them with skills such as coping skills or problem-solving strategies or emotional unburdening.
7. **Working with School Administration:** working as bridge in between student's and administration.

- At Institute level:

- (i) Student-Mentor scheme: The senior student has been appointed to mentoring the junior students.
- (ii) 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.
- (iii) 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 Electronics and Communication 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	Er. 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 Expert/ Speaker, Designation	Organisation/ Institute	Date	Field of Talk
Dr. J S Ubhi	Institution of Engineers (India), Bathinda	December 04-05, 2021	5G: The Catalyst to Digital Revolution
Dr. Dilip Kumar, Professor (ECE)	Giani Jail Singh Campus, College of Engg. and Technology, MRSPTU, Bathinda, Punjab	February, 17, 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	Experts/ Agency	No. of students/ participants



1	Workshop on "Low Frequency (LF) and High Frequency (HF) Design using Tarang: 19"	5-6, October, 2019	Er. Swapnil Narhari Gaul, Founder, and Director, NUMEREGION	40
2	Short term course on "Nano-Electronics and VLSI: Devices, Circuits, and Systems"	4-8, November, 2019	TEQIP-III sponsored	25
3	Faculty Development Programme (FDP) for Student Induction on Universal Human Values	15 -17, November, 2019	AICTE sponsored	53
4	Short-term course on "Recent Trends in Wireless Communication"	20 -24, July, 2020	TEQIP-III sponsored	100(Approx.)
5	STTP on "Intelligent Systems & Networks (ISN-2020)"	31/08/2020 to 04/09/2020	TEQIP-III sponsored	41
6	Short term course on "Recent Trends in Electronics and Communication Engineering (RTECE-2020)"	20-25, December, 2020	QIP sponsored	70
7	Short-term course on "Computational Techniques in Image and Signal Processing"	September 28 to October 3, 2020	QIP sponsored	130
8	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
9	5-Days ATAL FDP program on "Recent Trends in Precision Agriculture "	31st May 2021 to 4th June 2021	AICTE sponsored	147
10	Six Weeks Online Summer Internship Program on "Recent Trends in RF Technology (Simulation and Fabrication)"	June 21-July 30, 2021	Dr. Kundan Kumar and Er. Alka Singla	137
11	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

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12.	Two-day online workshop on "Scientific Writing Using LaTeX"	March 14-15,2022	Er. Vipul Singhal and Dr. Ashwani Aggarwal	39
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**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/Er. Vipul Singhal, Editor (ECE)
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 $\geq 60\%$ and <80% ✓	08 marks
Students attended any practical, non-academic activity related to skill development $\geq 40\%$ and <60%	06 marks
Students attended any practical, non-academic activity related to skill development $\geq 20\%$ and <40%	04 marks
Students attended any practical, non-academic activity related to skill development <20%	02 marks

**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 employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education.

Total Practicle and 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, $\geq 75\%$	10 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, $\geq 60\%$ and <75%	08 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, $\geq 50\%$ and <60% ✓	06 marks
Hands on training load (Practical+ Project +industrial training)/ total ICD load, $\geq 40\%$ 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 was 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) Foundary 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.

Advanced Communication Laboratory	Basic Electronics	Broadband/Photonics Communication Lab
Digital Signal Processing	Digital System Design	Computer/Ph.D. Research Laboratory
Electromagnetic Measurement and Testing Lab	Microprocessor & Microcontroller Laboratory	Microwave Engineering Laboratory
Printed Circuit Board Laboratory	Servicing & Maintenance/Industrial Electronics Laboratory	Television Engineering Laboratory
U.G. Project Lab	Machine Vision and Motion Control Lab	

**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 ≥60% and <80%	08 marks
The workshop/lab can provide hands-on training for skill development ≥40% and <60%	06 marks
The workshop/lab can provide hands-on training for skill development ≥20% and <40%	04 marks
The workshop/lab can provide hands-on training for skill development <20%	02 marks

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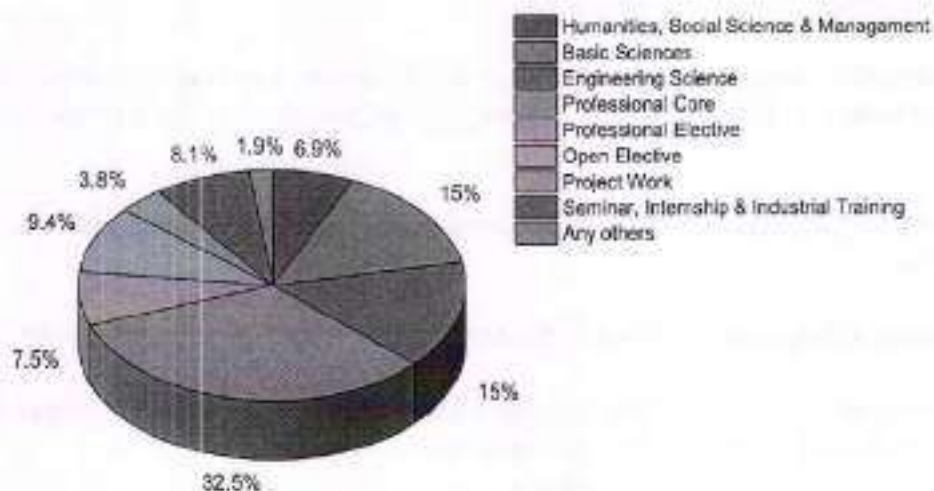


## A.2 UG programme

### 1. Curriculum (Structure, Course Syllabi, Flexibility)

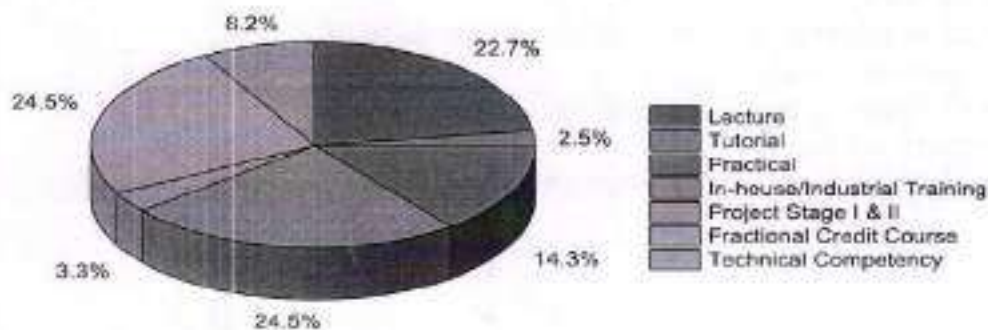
The UG curriculum is created by members of the Board of Studies (BOS) at the department level and approved by the institute's Senate. The BOS periodically revises its curriculum based on input from many stakeholders, including students, academics teaching and researching the discipline, and industry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

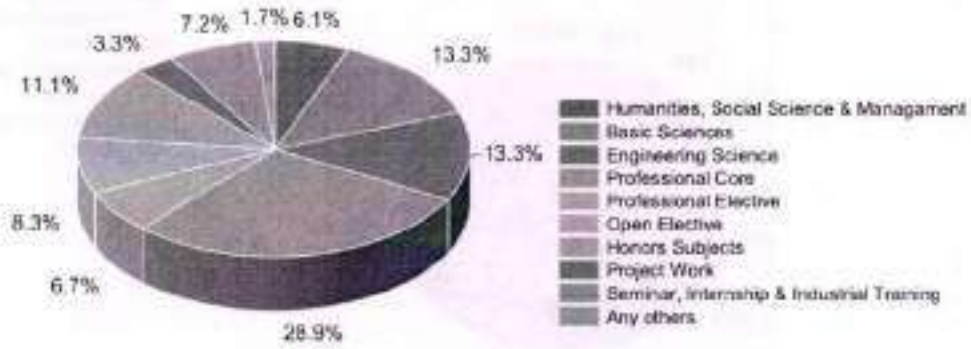


#### B.E. (ECE) Programme Hourly Distribution

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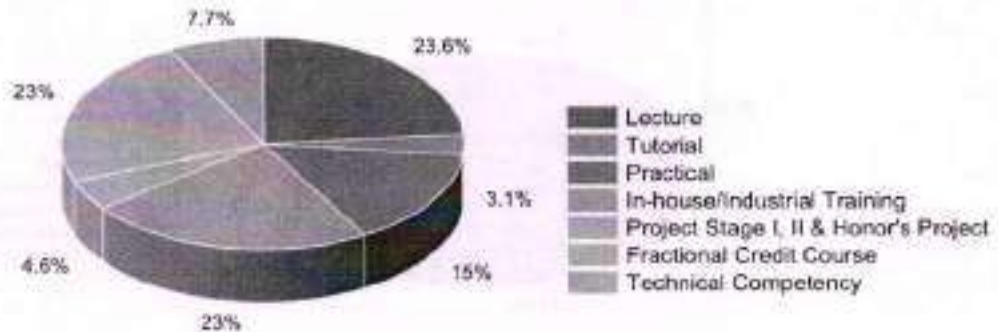
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**C) B. E. Electronics and Communication Engineering (Honors Degree) Credit System**



Bachelor of Engineering (ECE) Honors Degree Credit Score

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

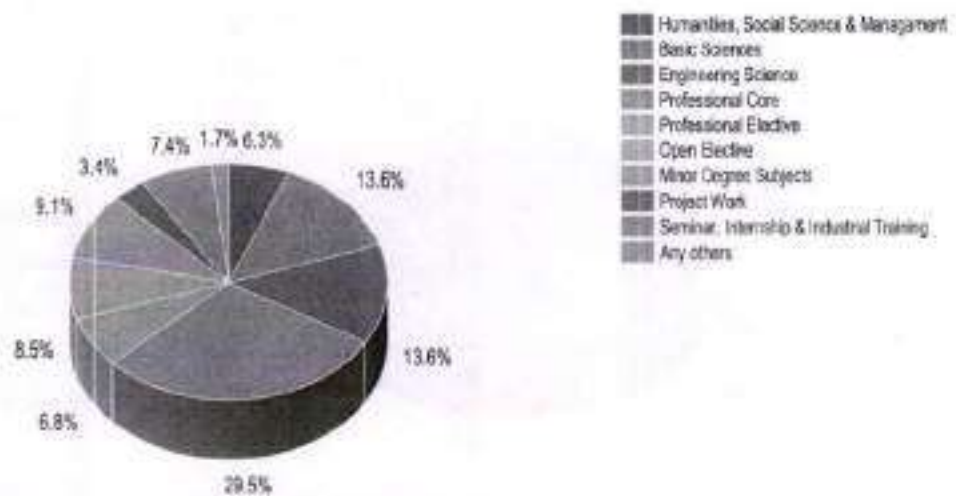


B.E. Electronics and Communication Engineering (Honor's Degree) Hourly Distribution

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

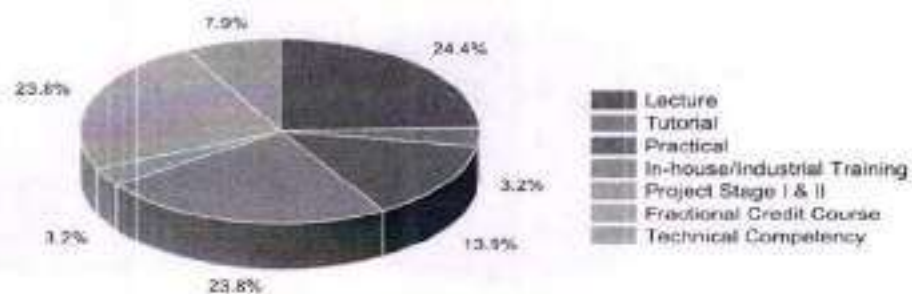
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B.E. Electronics & Communication Engineering (Minor Degree) Credit Score

**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

**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
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**2. Status of study material developed by faculty for students:**

The quality of the teaching-learning result is directly linked. Usually, only textbooks are utilized with traditional lecture-based instruction. So, creating teaching and learning materials is required. Creating study materials allows teachers to learn new things while educating pupils. It also helps teachers improve their abilities. 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. Teachers need to research and promote modern and innovative methods to enrich the education system. The advancements in teaching-learning materials are brought about on the basis of a number of aspects such as grade levels of students, academic goals and objectives, and subjects and concepts. When these are introduced, the educators need to ensure that they prove to be beneficial to the students in achieving academic goals.

**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 curriculum/syllabus according to the needs, to eliminate unnecessary units & contents, and introduce the latest and updated content, new knowledge & practices is necessarily required.

Honours courses have been introduced during session 2021-22 as under:

- AI and machine learning
- Optoelectronic devices and circuits
- Circuit design for electronic system
- IOT & applications
- Projects

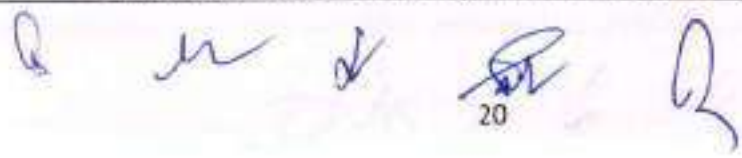
**Assessment rubrics**

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:

<b>Credit Structure of Undergraduate Engineering Program</b>
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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
<b>Total number of Credits</b>						<b>160</b>	

#### 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.

**Remarks:** Insufficient video lectures developed by faculty.

#### 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)

- (i) Theory and tutorial
- (ii) Practical (case studies)

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



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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.

**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 all the 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			

**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
<b>Continuous assessment norms (for each exercise/experiment):</b>	
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 ✓	<b>10 marks</b>
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 (1 hour in a week)
- Course counsellor-student meeting (1 hour in a week)
- Training coordinator-student meeting ((1 hour in a week)
- Meeting in respective hostels (1 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 ✓	<b>08 marks</b>
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

Departments have constantly worked to provide industry tours/internships/summer training to students to gain practical experience and professionalism. The undergraduate programme requires one obligatory in-house and one mandatory industry/summer training. The institute's T&P department has formed a training placement and industry-institute liaison cell in addition to appointing Training and Placement Coordinators. The department organizes educational



visits to important sectors to help students comprehend real-world issues, get practical experience, and inspire them to analyze and bridge the gap between academia and industry. Internships. 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.

Students' Summer Training is arranged by the department of Training and Placement along with Training Coordinators of the department through developing interaction with the industries. Institute has built up a good rapport with various reputed industries. 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. The in-house training is also provided to the students at the institute after the first year, which gives them the motivation to become ready for the engineering journey.

During this period of COVID-19, the department has formulated the modules for Summer/in-house training besides internship/ summer training in the industry for the students. Faculty coordinators for each UG class as well as faculty mentors to a group (3-5 students each) of students were also assigned for guidance and monitoring the progress.

#### 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. Effectiveness of Assisted Learning In Tutorial classes/seminars for Students

##### Faculty Mentoring/Faculty Advisor System for Students/Class of Students

Due to Covid tutorial classes could not be organised for weaker 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 options (last three years)

Number of students placed in 2019-20 are 40/64

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

Number of students placed in 2021-22 are 33/61

Average number of students = 71%

#### 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	RTL simulation & Synthesis with PLDs / RF Circuit Design/ CAD of Digital Systems	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	Advanced Communication Lab	0	0	4	4	2
9	PEEC 813	Core Elective Lab -1	0	0	4	4	2
<b>Total</b>			<b>16</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>18</b>

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	3	0	0	3	3
4	PEEC 822	Statistical Information Processing/Satellite Communication/Micro and Nano-photonics	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
<b>Total</b>			<b>14</b>	<b>1</b>	<b>10</b>	<b>25</b>	<b>18</b>

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

25

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1	PEEC 911	Wireless Sensor Networks/Network Security and Cryptography/Advanced Computer Networks	3	0	0	3	3
2	OEEC 911	Electronic Product Design/Artificial Intelligence/Optical Communication Systems	3	0	0	3	3
3	PCEC 911	Dissertation (Part-1)	0	0	20	20	10
<b>Total</b>			<b>6</b>	<b>0</b>	<b>20</b>	<b>26</b>	<b>16</b>
<b>Semester-IV</b>							
Sr. No.	Subject Code	Subject Name	L	T	P	Hrs.	Credits
1	PCEC 921	Dissertation (Part-2)	0	0	32	32	16
<b>Total</b>			<b>0</b>	<b>0</b>	<b>32</b>	<b>32</b>	<b>16</b>

**Total Credits: 68**

**List of Program Specific Elective Courses**

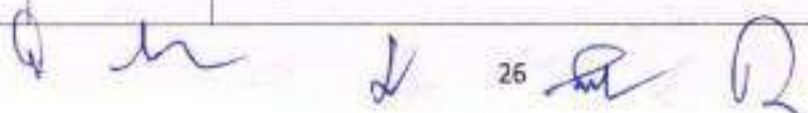
<b>ELECTIVE-I (PEEC 811)</b>		
Sr. No.	Sub Code	Subject Name
1	PEEC-811A	Digital Logic design
2	PEEC-811B	RF Circuit Design
3	PEEC-811C	CAD of Digital Systems

<b>ELECTIVE-II (PEEC 812)</b>		
Sr. No.	Sub Code	Subject Name
1	PEEC 812A	Antenna and Radiating System
2	PEEC 812B	Internet of Things
3	PEEC 812C	Remote Sensing

<b>ELECTIVE-III (PEEC 821)</b>		
Sr. No.	Sub Code	Subject Name
1	PEEC 821A	Advanced Digital Signal Processing
2	PEEC 821B	Soft Computing
3	PEEC 821C	Digital Image Processing

<b>ELECTIVE-IV (PEEC 822)</b>		
Sr. No.	Sub Code	Subject Name
1	PEEC 822A	Statistical Information Processing
2	PEEC 822B	Satellite Communication
3	PEEC 822C	Micro and Nano-photonics

<b>ELECTIVE-V (PEEC 911)</b>		
Sr. No.	Sub Code	Subject Name





1	PEEC 911	Wireless Sensor Networks
2	PEEC 911	Network Security and Cryptography
3	PEEC 911	Advanced Computer Networks

### 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)]

- 8-hours of teaching load is allocated on students and labs were conducted on time
- Thesis work accomplished by students

#### 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)s	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

<b>Pattern for Internal examination (CAM)</b>				
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 all the 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
<b>Pattern for end semester examination (ESM)</b>				
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			

**d) 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
<b>Continuous assessment norms (for each exercise/experiment):</b>	
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

- Availability of Library Resources and Major Search Engines (like Scopus, Web of science)
- 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**

40% to 60 % of students can go for industrial training but student have submitted the reports in prescribed format. Due to COVID number of industrial visits are less.

**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
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Students can go in other department and do their research work

**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 2<sup>nd</sup> semester. Continuous monitoring is done through time-to-time presentations

**Assessment rubrics**

Number of continuous evaluations of project work > 3 ✓	<b>10 marks</b>
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

*[Handwritten signatures and arrows pointing to the table rows]*

**A.4 Doctoral (Ph.D.) Programmes**

**1. Intake of Ph.D. Students**

2021-22:

- |                       |   |
|-----------------------|---|
| 1. Kumar Gaurav Suman | Date of Enrolment, 09.11.2021 (Full time with fellowship)     |
| 2. Kuldip Singh       | Date of Enrolment, 11.10.2021 (Part time)                     |
| 3. Vipul Singhal      | Date of Enrolment, 11.10.2021 (Part time)                     |
| 4. Nisha Sharma       | Date of Enrolment, 16.03.2022 (Full time with ADF 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

2021-22:

1	Kumar Gaurav Suman	All guidelines fulfilled and students are GATE/ NET qualified and interviewed
2	Kuldip Singh	All guidelines fulfilled and student is SET qualified and interviewed
3	Vipul Singhal	All guidelines fulfilled and student is SET qualified and interviewed
4	Nisha Sharma	All guidelines fulfilled and student is GATE/ NET qualified and interviewed

**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 guide lines fulfilled and students are SET qualified	04 marks
Major deviations from guide lines 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.

2021-22:

- |                       |   |
|-----------------------|---|
| 1. Kumar Gaurav Suman | Completed coursework and presented seminars |
| 2. Kuldip Singh       | Completed coursework and presented seminars |
| 3. Vipul Singhal      | Completed coursework and presented seminars |

*[Handwritten signatures and initials]*



### 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.

2021-22:-

1	Kumar Gaurav Suman	All the students are score 70-79% in qualifying examination and interview
2	Kuldip Singh	
3	Vipul Singhal	
4	Nisha Sharma	

### 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. Sarbjeet Singh Presented annual progress presentation
2. Alka Singla Presented annual progress presentation
3. Rajdavinder Kaur Sidhu Presented annual progress presentation
4. Rajeev Kumar Presented annual progress presentation
5. Amandeep Kaur Presented annual progress presentation
6. Vishal Sharma Presented annual progress presentation and fellowship extension
7. Jasvir Singh Kalsi Presented annual progress presentation and fellowship extension
8. Sharu Bansal Presented annual progress presentation and fellowship extension
9. Amit Kumar Shakya Presented annual progress presentation
10. Radha Singla Presented annual progress presentation
11. Sudhir Kumar Presented annual progress presentation and fellowship extension
12. Ayushman Ramola Presented annual progress presentation
13. Tarun Kumar Presented annual progress presentation
14. Vivek Harshey Completed coursework and presented credit seminars
15. Kumar Gaurav Suman Completed coursework and presented credit seminars
16. Kuldip Singh 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**

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

**Research Lab-II:** 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.

**Research Lab-III:** VECTOR NETWORK ANALYZER (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

**Research Lab-IV:** Image Processing Equipment (Monochrome Machine Vision System): Sony IEEE1394 Monochrome Camera 1024×768 Resolution 30FPS, NI-PCI-8252, IEEE1394 Integrated Board and Vision Acquisition Software, IEEE1394, 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 18  
 Average No. of Research Students/Faculty 2.57

**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)**

2021-22

*Handwritten signatures and marks in blue ink.*



Thesis submitted:

1.	Sandeep Kohar	Submission date 05.8.21 Defence date 07.03.2022
2.	Mukesh Kumar	Submission date 09.11.20 Defence date 02.08.2021
3.	Ashwani Kumar	Submission date 15.01.21 Defence date 12.11.2021

### Research Papers:

1. 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**
2. 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.
3. Prashar, Deepak, Mamoon Rashid, Shams Tabrez Siddiqui, Dilip Kumar, Amandeep Nagpal, Ahmed Saeed AlGhamdi, and Sultan S. Alshamrani. "SDSWSN—A Secure Approach for a Hop-Based Localization Algorithm Using a Digital Signature in the Wireless Sensor Network." *Electronics* 10, no. 24 (2021): 3074, **I.F. 2.69**.
4. Singh, Sarbjeet, and Dilip Kumar. "A Public Key Authentication and Privacy Preserving Model for Securing Healthcare System." *IETE Journal of Research* (2021): 1-13, **I.F. 1.87**.
5. Singh, Sarbjeet, and Dilip Kumar. "An Efficient use of Privacy Preserving Resources in IoT based Healthcare." In *2021 10th International Conference on Internet of Everything, Microwave Engineering, Communication and Networks (IEMECON)*, pp. 1-5. IEEE, 2021.
6. Dilip kumar, Sudhir kumar, "Lower index liquid chemical detection by using photonic crystal fiber sensor," *Materials Today: Proceedings* 64(1), 69-73, 2022.
7. 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.
8. Dilip Kumar, Tarun Kumar and Gurmohan Singh. "Error Mitigation of Grover's Quantum Search Algorithm." *Indian Journal of Pure & Applied Physics (IJAP)* 60 (8), 644-649, 2022 **I.F. 0.846**.
9. 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**
10. 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**.
11. 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. 3.702**
12. 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**
13. 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.



14. 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.
15. 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**
16. Kumar, Y., R. Kumar, K. Asokan, Ramcharan Meena, R. J. Choudhary, and A. P. Singh. "120 MeV Ag<sup>9+</sup> induced modifications in the structural, electrical and optical properties of La-doped SrSnO<sub>3</sub> thin films." *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* 519 (2022): 22-27, **I.F. 1.279.**
17. Aggarwal, Monika, and Amar Partap Singh Pharwaha. "Modified Koch curve broadband fractal antenna for spectrum sensing in cognitive radio." *International Journal of Microwave and Wireless Technologies* 13, no. 9 (2021): 947-953, **I.F. 1.09**
18. Seth, B. M., V. Uniyal, D. Kumar, and A. Singh. "Sorption of cationic and anionic dyes by dead biomass of filamentous green alga *Cladophora* sp.(Chlorophyceae)." *International Journal of Environmental Science and Technology* (2021): 1-12, **I.F. 3.519.**
19. Rani, Pooja, Bikash Chandra Sahoo, Gurmeet Singh, Ashish Kumar, and A. P. Singh. "On the Design of Slotted Linear Patch Antenna Array for Wireless Communication." In *2021 IEEE Indian Conference on Antennas and Propagation (InCAP)*, pp. 48-51. IEEE, 2021.
20. Harshey, Vivek, S. K. Bansal, and Devendra Chack. "A State-of-the-Art Study on Physical Unclonable Functions for Hardware Intrinsic Security." In *Nanoelectronic Devices for Hardware and Software Security*, pp. 139-162. CRC Press, 2021.
21. Harshey, Vivek, Pankaj Kumar Das, and Shivani Sharma. "LOW POWER DYNAMIC CMOS INVERTER AND SRAM CELL DESIGN USING LECTOR AND LECTOR-B TECHNIQUE."
22. Harshey, Vivek, and S. K. Bansal. "Designing of Variations Tolerant Sensing Amplifier Circuit for Deep Sub-Micron Memories." *ICTACT Journal on Microelectronics* 6, no. 4 (2021): 1027-1033.
23. Kumar, Kundan, Santanu Dwari, and Mrinal Kanti Mandal. "An ultra-wideband surface wave antenna with reduced ground plane effects." *International Journal of RF and Microwave Computer-Aided Engineering* 31, no. 11 (2021): e22819. **I.F. 1.987**
24. Priya, Shruti, Kundan Kumar, Santanu Dwari, and Mrinal Kanti Mandal. "Wideband SIW self-diplexing antenna with simultaneous control of bandwidth and band position." *AEU-International Journal of Electronics and Communications* 138 (2021): 153877. **I.F. 3.169**
25. Kumar, Kundan, Shruti Priya, Santanu Dwari, and Mrinal Kanti Mandal. "Self-quadruplexing circularly polarized SIW cavity-backed slot antennas." *IEEE Transactions on Antennas and Propagation* 68, no. 8 (2020): 6419-6423. **I.F. 4.824**
26. Kumar, Kundan, Santanu Dwari, and Mrinal Kanti Mandal. "An ultra-wideband surface wave antenna with reduced ground plane effects." *International Journal of RF and Microwave Computer-Aided Engineering* 31, no. 11 (2021): e22819, **I.F. 1.987**
27. V. Kaur and S. Singh, "D-Shaped Photonic Crystal Fiber Based Surface Plasmon Resonance Sensor Using Dual Coating of Metal Oxide for Healthcare Applications," 2021 IEEE 16th Nanotechnology Materials and Devices Conference (NMDC), 2021, pp. 1-4, doi: 10.1109/NMDC50713.2021.9677553.
28. Vishal Sharma, Surinder Singh, Lovkesh Bahtia, Elena A. Anashkina, and Alexey V. Andrianov "Optical frequency comb generation by the exploitation of gain modulation phenomenon in semiconductor optical amplifier," *Optical Engineering* Vol. 60(6), 066108 2021. **I.F. 1.352**



29. Sandeep Kohar, Surinder Singh & Asok De (2021) Design of Low Profile Cylindrical Conformed Microstrip Patch Antenna for Wideband Operation, IETE Journal of Research, DOI: 10.1080/03772063.2021.1951377, I.F. 1.877
30. 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
31. T Kaur, S Singh, EA ANASHKINA, AV ANDRIANOV, "Design analysis of multi-wavelength conversion based on XAM effect of EAM for high-speed optical transmission," Optoelectronics and Advanced Materials-Rapid Communications, Vol. 15, pp. 307-313, 2021, I.F. 0.556
32. Vishal Sharma, Surinder Singh, Lovkesh Bahtia, Elena A. Anashkina, and Alexey V. Andrianov " Demonstration of optical frequency comb generation using four-wave mixing in highly nonlinear fiber," Optik, Vol. 241, pp. 166948, 2021, I.F. 2.84
33. Ramola, A., Marwaha, A. & Singh, S. Design and investigation of a dedicated PCF SPR biosensor for CANCER exposure employing external sensing. Appl. Phys. A, Vol. 127, pp. 643 2021, I.F. 2.983
34. Sandeep Kohar, Surinder Singh, Asok De. (2021) Design of Low Profile Cylindrical Conformed Microstrip Patch Antenna for Wideband Operation. IETE Journal of Research 0:0, pages 1-10, 2021, 10.1080/21681724.2020.1793394, I.F. 1.877
35. Kumar, R., Singh, S. & Chauhan, A.P.S. Split Ring Inspired Tri/Dual Band PIFA Antenna for Implantable Biomedical Devices. Wireless Pers Commun, Vol. 121, 687-706, 2021. <https://doi.org/10.1007/s11277-021-08656-0>, I.F. 2.017.
36. Vishal Saharma, Surinder Singh and Lovkesh, "Cross-phase modulation based ultra-flat 90-line optical frequency comb generation," Optical and Quantum Electronics, Vol. 53, issue 11, article no. 657, 2021, I.F. 2.76.
37. Vishal Sharma, Surinder Singh, Lovkesh Bhatia, "Theoretical model of cascaded electro-optic intensity modulator-based 2.31-THz broad optical frequency comb generator," Optical Engineering, Vol. 60 (11), 115107, 2021. I.F. 1.352
38. Vishal Sharma, Surinder Singh and Lovkesh, "340 Gb/s all-optical NOT, XOR, XNOR,  $\bar{A}B$ ,  $A\bar{B}$ , OR and NOR logic gates based on cross-gain modulation in semiconductor optical amplifiers," Optik, Vol. 247, 168016, 2021, I.F. 2.84
39. Amit Kumar Shakya, Surinder Singh, "Design of novel pentacore PCF-SPR RI sensor based on fusion of IMD and EMD technique for analysis of water and transformer oil," Measurement, Vol. 188, 110513, 2021, I.F. 5.131.
40. 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.
41. 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
42. 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 Junel, 2022, doi: 10.1109/JSEN.2022.3168827, I.F. 4.325.
43. 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.
44. Amit Kumar Shakya, Surinder Singh, "Design of Biochemical biosensor based on transmission absorbance and refractive index," Biosensors and Bioelectronics-X, Vol.10, 100089, 2022.
45. Rani, S., Marwaha, A., Marwaha, S. Optimizing the Position of Graphene Oxide Absorber to Enhance the Radiation Pattern of Antenna Array. 2nd IEEE International Conference on Electrical Power & Energy Systems, MANIT Bhopal, and Department of Electrical & Instrumentation, SLIET Longowal. 1-5, (2021).



46. 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).
47. Mukesh Kumar, Jagpal Singh Ubhi, Sanjeev Basra, Anuj Chawla, H.S. Jatana, "Total ionizing dose hardness analysis of transistors in commercial 180 nm CMOS technology" Microelectronics Journal, Volume 115, 105182, 2021 (Impact factor 1.605)
48. 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.

**Average No. of Research Papers of Ph. D Students**      **48/13 = 03.69**

**Assessment rubrics**

Average number of Research Papers of Ph.D. Students $\geq 5$	10 marks
Average number of Research Papers of Ph. D Students 4 ✓	<b>8 marks</b>
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.	Sandeep Kohar	Enrolment date 18.02.2013 Defence date 07.03.2022
2.	Mukesh Kumar	Enrolment date 28.07.2015 Defence date 02.08.2021
3.	Ashwani Kumar	Enrolment date 22.07.2016 Defence date 12.11.2021

**Average Duration to Complete Ph.D: 6.67 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 ✓	<b>4 marks</b>
Average duration to complete Ph. D. 7 years	2 marks

**10. Participation of Research Scholars in Conferences/Workshops**

To provide the contingency grant to the research scholar to purchase small consumable items / additional page charge fee in peer review journal/ to attend the workshop in IITs/ISRO/DRDO.

**Average number of participations  $\geq 3$  and  $< 5$**

**Assessment rubrics**

Average number of participations $> 9$	10 marks
Average number of participations $\geq 7$ and $< 9$	8 marks
Average number of participations $\geq 5$ and $< 7$	6 marks



Average number of participations $\geq 3$ and $< 5$ ✓	4 marks
Average number of participations $\geq 1$ and $< 3$	2 marks

## B RESEARCH

### 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 seven faculty members competent to guide doctoral students. At present there are thirteen 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.

- **Faculty Qualification:** 7 faculty members out of 13 having qualification with PhD i.e. 60% to 80%
- **Research facilities/ infrastructure:** Adequate research facilities/ research infrastructure
- Less number of research scholars

#### 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

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 out with the research proposal.

**Rajeev Kumar:**

**Workshops:**

- [1] 5 Days AICTE Training & Learning (ATAL) Academy FDP on Modern Antenna Technologies for Futuristic Wireless Communication Systems (Aug 2021) at Guru Jambheshwar University of Science & Technology, Hisar, Haryana (Online).

- [2] 1 week STTP workshop on Recent Trends of Microwave and Photonics Technology in Dec 2021

**Expert Lecture:**

- [1] Expert Lecture Delivered on "Microstrip Patch antenna design using HFSS tool" in Six week Internship Program on Recent Trends of RF Technology in June-July 2021 in SLIET, Longowal.

**Vishal Sharma**

**Workshops:**

- [1] Two days online workshop on " SCIENTIFIC WRITING USING LATEX", scheduled on 14-15 MARCH, 2022 organized by ECE and EIE Department of SLIET LONGOWAL
- [2] 1 week STTP workshop on Recent Trends of Microwave and Photonics Technology in Dec 2021.

**Tarun Kumar**

- [1] 1 week STTP workshop on Recent Trends of Microwave and Photonics Technology in Dec 2021

**Amit Kumar Shakya**

**Conferences**

- [1] Amit Kumar Shakya, Surinder Singh, "Designing of a Novel PCF Biosensor having Octagonal Core and based on Surface Plasmon Resonance for Chemical and Heavy Metal sensing" IEEE, Confluence-2022:12th International Conference on Cloud Computing, Data Science & Engineering, 2022, 171-175.
- [2] Amit Kumar Shakya, Surinder Singh, "Gold-ZnO Coated Surface Plasmon Resonance based Refractive Index Sensor Based on Photonic Crystal Fiber with Tetra Core in Hexagonal Lattice of Elliptical Air Holes" Springer, International Conference on Robotics, Control and Computer Vision. Feb. 19 - 20, 2022.

**Workshops:**

- [1] TWO DAYS ONLINE LECTURE SERIES on Fundamentals and Applications of Technology Driven Sensors organized by IEEE-ELECTRON DEVICES SOCIETY DELHI CHAPTER-India on 24th- 25th SEPTEMBER 2021.
- [2] 1 week STTP workshop on Recent Trends of Microwave and Photonics Technology in Dec 2021.

**Jasvir Kalsi**

- [1] 1 week STTP workshop on Recent Trends of Microwave and Photonics Technology in Dec 2021

**Assessment Rubrics**

Research awareness among doctoral students by 01 conference per year	<b>10 marks</b>
✓ 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

*(Handwritten signatures and 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.

#### VLSI & Embedded Systems

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 collaboration of the research work and sharing of expertise. 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 JS Ubhi** have published quality research papers with the scientist of SCL. This thrust area also aligns with the GoI 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. As part of the Covid initiative, the department has designed a *touch-less sanitizer*. Also UG projects students have designed sanitizer and soil salinity monitoring as a local relevance.

#### Broadband Communication

Today at the national level we are moving towards launching the 5G services in the country and therefore the technological infrastructure and know-how required for implementing, developing, and maintaining the 4G and 5G systems are essential. ECE department since its inception 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 newly admitted research scholar is working in Terahertz antenna design which has national relevance in the context of the 5G rollout in the country.

Research in microwave absorbers is being carried out by the Broadband Communication group. Exposure of electromagnetic radiations provide stress on human body, weaken immune system, damage healthy cells and can lead to cancer and infertility. Therefore, EM pollution is a global problem and affects urban population more than rural one. Hence, designing an efficient microwave absorber is utmost required for the safety of those people who live in high alert electromagnetic zones. Nanomaterial based microwave absorbers in form of paint can be incorporated on Aircraft surface to reduce its radar cross sectional area. This technique minimizes the aircraft visibility which is useful for military purposes. Further, microwave absorbers tailored in resonating cavities and pyramidal structures can be used to build anechoic chambers utilized for laboratory testing of electromagnetic equipment.

Adding to that microwave absorbers in form of rectangular strips can be utilized to reduce the mutual coupling effect in an antenna array. These strips when placed between array elements absorbs interelement antenna waves, significantly reduced side lobe which enhanced the radiation pattern of array.



### Intelligent Systems & Networking

With the emergence of Artificial Intelligence and Smart systems in every sphere of our daily life it becomes increasingly important to align the research work with this domain. To this end the ECE department is focusing on the development and design of tools and techniques to aid precision agriculture. **Dr Dilip Kumar** has been appointed as a convener of "Technology for Agriculture" by the Institute. This group will work 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 which closely align with these thrust areas. Ph.D. scholars are also enrolled for research in this domain to design smart system for local farmer to boost crop yield using IoT and machine learning. Also, Ms Amandeep Kaur has worked on designing a deep learning-based system for disease diagnosis. The Punjab region has high prevalence of cancer cases and therefore the department is also working closely with Homi Bhabha Cancer Hospital, Sangrur.

**Dr Surinder Singh** and his team designed 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-sustainability.

As we are about to implement a 5G communication network in India, research has also been underway for 6G and more advanced communication networks. Such ultra-high speed communication networks' success depends on the backbone transport network. In a traditional approach, the backbone network is realized by exploiting the hundreds of discrete laser sources at both ends of the backbone network. This causes the inefficient use of available optical spectrum, higher power consumption, bulkier size and higher cost. Such problems can be solved by realizing a frequency and channel tunable multicarrier generator *i.e.* optical frequency comb, which is also the prime contribution of this Ph.D. work. By successfully implementing this work on the industry level, the problems like contention in the network due to high internet traffic can be solved for a long time.

#### **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**

Publication list with impact factor is provided in point 8 of A.4 (Ph.d work)

Average impact factor is 2.4

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

#### **Assessment rubrics**

*[Handwritten signatures and marks]*



- 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 $\geq 2$ ✓	2 marks
Average impact factor 1-2	1 mark
citation per faculty (WoS) $\geq 200$ ✓	2 marks
citation per faculty (WoS) 100-200	1 mark
citation per faculty (Scopus) $\geq 200$ ✓	2 marks
citation per faculty (Scopus) 100-200	1 mark
citation per faculty (Google Scholar) $\geq 300$ ✓	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.
- -- TechFest is organized by the institute and Dr Dilip Kumar was the chairman in collaboration with the other department.
- -- Various STC and workshop is organized by the ECE department in collaboration with the other department.
- --Research scholar Ms Swarn Preet is admitted in the department under joint guidance with the other department.

<http://ece.sliet.ac.in/mou/>

#### 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 796	14
Dr. Anupma Marwaha	Professor	Google Scholar 639	13
Dr. J.S. Ubhi	Professor	Google Scholar 177	7
Dr. Surinder Singh	Professor	Google Scholar 961	17
Dr. Ajay Pal Singh	Professor	Google Scholar 107	5

Dr. Dilip Kumar	Professor	Google Scholar 1505	18
Er. Pankaj Kumar Das	Assistant Professor	Google Scholar 76	4
Er Vivek Harshey	Assistant Professor	Google Scholar 03	1
Er Vipul Singhal	Assistant Professor	Google Scholar 02	1
Total Citations		4266	
Average Citation per author per year		474	

**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 $\geq 2$ ✓	<b>2.5 marks</b>
Average impact factor 1-2	1.5 marks
citation per faculty (WoS) $\geq 20$ ✓	<b>2.5 marks</b>
citation per faculty (WoS) 10-20	1.5 marks
citation per faculty (Scopus) $\geq 20$ ✓	<b>2.5 marks</b>
citation per faculty (Scopus) 10-20	1.5 marks
citation per faculty (Google Scholar) $\geq 30$ ✓	<b>2.5 marks</b>
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 $\geq 30$	5 marks
Total publications 20-30 ✓	<b>4 marks</b>
Total publications 10-20	3 marks
Total publications $< 10$	2 marks
All thrust areas covered ✓	<b>5 marks</b>
No thrust area covered	0 marks

**8. Student Exposure for Attending Quality Conferences/Symposia**

**Assessment rubrics**

2 marks each for maximum of 10

**9. Inter departmental collaborations**

- Prof. Anupma 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.
- Dr. Surinder Singh is collaborated with Dr. M.M Sinha

**Assessment rubrics**



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

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

Title of the project	Duration of project	Funding Agency	Amount of grant (Rupees)	Status
Optical Metrology of ultra-short pulses for design of flexible MIMO based next-generation optical Communication Network.	2 Years	DST-RFBR, New Delhi	21.48 Lakhs	On-Going
Design of all photonics logic circuits based on optical nonlinearities of semiconductor laser amplifier for ultra-high-speed applications (In collaboration with Punjabi University, Patiala)	3 Years	SERB, New Delhi	37.37 Lakhs	On-Going
Financial Assistance to the Department of Electronics and Communication Engineering of SLIET Longowal to augment of research facilities in the Department	5 Years	DST, New Delhi	61 Lakhs	On-Going
Design and development of photonic plasmonic biosensors for detection of heavy metals in ground water of Punjab.	3 Years	AICTE, New Delhi	25 Lakhs	On-Going
High-speed Multichannel Optical wireless communication system based on hybrid WDM Free Space Optics Transmission link for MIMO applications, sponsored.	3 years	Teachers associate for research excellence (TARE) funded by SERB-New Delhi	18.3 lakhs	On-Going

**Assessment rubrics**

Project amounting to  $\geq$  Rs. 50 lakhs ✓

**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

#### 1. Adequacy of Classrooms and Multi-Media Facility

Room Description	No. available	Capacity (no. of persons)	Remarks
No. of classrooms	05	60 (E-225), 100	sufficient as per strength
No. of smart classrooms	05	60 (E-333), 100	sufficient as per strength
Tutorial rooms	03	30	sufficient as per strength
No. of Seminar Hall	01	60	sufficient as per strength
No. of Committee Rooms	01	25	-
Classroom with Multi-media facilities	Portable multi-media projectors - 03, e-podium-06	-	sufficient as per strength

- The classrooms of other departments are being used for 1<sup>st</sup> year students of our department

#### 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	Technical Manpower support
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*(Handwritten signatures and marks)*



		<b>Important equipment, Computing Facilities</b>	<b>Name of Technical Staff</b>	<b>Designation</b>	<b>Qualification</b>
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	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	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	Technician	Diploma in ECE
6	PCB Lab	Vertical processor, Camera, Workstation, PCB making machine	Sh. Ravinder Singh	Technician	ITI
7	Microwave Engineering lab	Microwave bench, attenuators, microwave sources, TaraNG Antenna trainer kits	Sh. Amarjit Singh	Senior Technician	B.Tech
8	Machine Vision and Motion control Lab	LabVIEW software, colour camera, Workstation	Sh. Gurmit Singh	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	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	Technician	ITI in General Electronics
12	UG Project Lab	Universal programmer kit, Electronic test bench station	Sh. Partap Singh	Technician	Diploma in ECE/T V
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	LA	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	60	sufficient as per strength

*[Handwritten signatures and marks]*



No. of Committee Rooms	01	25	sufficient as per strength
No. of smart class Room Lecture Hall	05	60 (E-333), 100	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. are used at another department or centrally available at institute.

#### 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 (Windows based)	10	8GB RAM, 1 TB HDD.
3.	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 are working on this software for research on Optics.
HFSS, IE3D, TaraNG 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**

*[Handwritten signatures and scribbles]*



9. 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 3	5 marks

**9. Faculty- Student Ratio**

Total no. of students in dept. (sanctioned ICD/B.E./M.E.) = 320 nos.  
(excluding 1<sup>st</sup> 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 – 00 nos.

Faculty – student Ratio of Department of ECE, SLIET during 2021-22 is found to be 1:24 that is 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) – 08 nos.
- No. of Technicians (on Contract) - 00 nos.
- No. of Lab Attendant - 01 no.
- Administrative staff (Clerk/ MTS) - 03 nos. ( Clerk 02, MTS 01)

**Assessment rubrics**

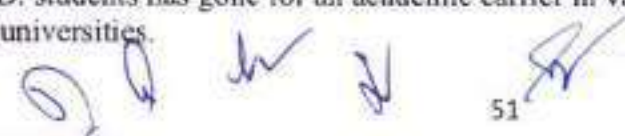
Adequate technical staff / lab $> 1$ ✓	5 marks
Adequate technical staff / lab = 1	4 marks
Adequate technical staff / lab $> 1$	3 marks
Adequate Technical Staff on regular basis ✓	2 marks
Adequate Technical Staff on regular basis ✓	3 marks

**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 2018 batch are placed.
- III. There are 2 M.Tech students, one is placed in BSNL and 1 students has gone for higher studies.
- IV. Ph.D. students has gone for an academic carrier in various colleges such is CU and other private universities.



**Assessment rubrics**

Placement %age/higher studies for ICD >80%	2 marks
Placement %age/higher studies for ICD >50% and <80% ✓	<b>1.5 marks</b>
Placement %age/higher studies for ICD ≥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% ✓	<b>3 marks</b>
Placement %age/higher studies for UG ≥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% ✓	<b>1.5 marks</b>
Placement %age/higher studies for PG ≥30% and <50%	1 mark
Placement %age/higher studies for PG <30%	0.5 mark
Placement %age/higher studies for Ph.D. >80% ✓	<b>2 marks</b>
Placement %age/higher studies for Ph.D. >50% and <80%	1.5 marks
Placement %age/higher studies for Ph.D. ≥30% and <50%	1 mark
Placement %age/higher studies for Ph.D. ≥1% and <30%	0.5 mark

**2. Average Number of Ph. Ds awarded per year**

1.	Sandeep Kohar	Enrolment date 18.02.2013 Defence date 07.03.2022
2.	Mukesh Kumar	Enrolment date 28.07.2015 Defence date 02.08.2021
3.	Ashwani Kumar	Enrolment date 22.07.2016 Defence date 12.11.2021
4.	<b>Sarbjeeet Singh</b>	<b>Submitted</b> <b>Defence date: Not defended yet</b>
5.	Rajeev Kumar	<b>Submitted</b> <b>Defence date: Not defended yet</b>

**Assessment rubrics**

Number of Ph.D. defence in an academic year = 3 ✓	<b>07 Marks</b>
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 ✓	<b>04 marks</b>
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 ✓	<b>10 Marks</b>
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  $\geq 0.1$  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 796	14
Dr. Anupma Marwaha	Professor	Google Scholar 639	13
Dr. J.S. Ubhi	Professor	Google Scholar 177	7
Dr. Surinder Singh	Professor	Google Scholar 961	17
Dr. Ajay Pal Singh	Professor	Google Scholar 107	5
Dr. Dilip Kumar	Professor	Google Scholar 1505	18
Er. Pankaj Kumar Das	Assistant Professor	Google Scholar 76	4
Er Vivek Harshey	Assistant Professor	Google Scholar 03	1
Er Vipul Singhal	Assistant Professor	Google Scholar 02	1
Total Citations		4266	
Average Citation per author per year		474	

Assessment rubrics

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

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%)

Assessment rubrics

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

**6. 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 ✓	<b>10 marks</b>
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

**Assessment rubrics**

Number of students took Academics as Career $\geq$ 5 ✓	<b>10 Marks</b>
Number of students took Academics as Career $\geq$ 4 and $<$ 5	08 Marks
Number of students took Academics as Career $\geq$ 3 and $<$ 4	06 Marks
Number of students took Academics as Career $\geq$ 2 and $<$ 3	04 Marks
Number of students took Academics as Career = 1	02 arks

**8. Students offered for higher studies**

*[Handwritten signatures and marks]*



**Assessment rubrics**

% of students opted for higher studies in a academic year $\geq 20$	10 Marks
% of students opted for higher studies in a academic year $\geq 15$ and $< 20$	08 Marks
% of students opted for higher studies in a academic year $\geq 10$ and $< 15$	06 Marks
% of students opted for higher studies in a academic year $\geq 5$ and $< 10$ ✓	<b>04 Marks</b>
% of students opted for higher studies in a academic year $\geq 0.1$ 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 $\geq 20$	10 Marks
% of students qualified GATE in a academic year $\geq 15$ and $< 20$	08 Marks
% of students qualified GATE in a academic year $\geq 10$ and $< 15$	06 Marks
% of students qualified GATE in an academic year $\geq 5$ and $< 10$ ✓	<b>04 Marks</b>
% of students qualified GATE in an academic year $\geq 0.1$ and $< 5$	02 marks

**10. Entrepreneurship**

Lacking in this point.

**Assessment rubrics**

% of students opted for entrepreneurship in an academic year $\geq 20$	10 Marks
% of students opted for entrepreneurship in an academic year $\geq 15$ and $< 20$	08 Marks
% of students opted for entrepreneurship in an academic year $\geq 10$ and $< 15$	06 Marks
% of students opted for entrepreneurship in an academic year $\geq 5$ and $< 10$	04 Marks
✓ % of students opted for entrepreneurship in an academic year $\geq 0.1$ and $< 5$	<b>02 Marks</b>

*(Handwritten signatures and marks)*

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

**Table 1: Faculty requirement Calculations for Department \_\_\_\_\_**

Program me	Sanctioned Strength	Admitted Students		Duration of Programme	Total Students	STR (as per AICTE)	Faculty required
ICD	19(CSME)+18 (CTV)=37	1 <sup>st</sup> year	19+18	3-years	106		
		2 <sup>nd</sup> year	17+18				
		3 <sup>rd</sup> year	18+16				
UG	31	1 <sup>st</sup> year	30	4 years	30	343/13= 26.38	02
		2 <sup>nd</sup> year	72	3 years	200		
		3 <sup>rd</sup> year	67				
		4 <sup>th</sup> year	61				
PG	22	1 <sup>st</sup> year	4	2 years	7		
		2 <sup>nd</sup> 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	00	32 (on sharing basis)	378
Total: 437 hours					Balance: 59 hours

**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.

*[Handwritten signatures]*



4. Similarly, for tutorial classes, one group of students in the range of 30 to 35, be considered.

200

2

2

2