GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

An Autonomous College U/S UGC Act – 1956 [2(f) and 12(B)]

Syllabus (3rd-8th Semester)

for

Undergraduate Degree Programme

Bachelor of Technology

ELECTRONICS AND COMMUNICATION ENGINEERING

Scheme & Syllabus

Batch 2018 onwards

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA
Department of Electronics and Communication Engineering
Syllabus Scheme for B. Tech.–Electronics and Communication Engineering (Batch 2018 onwards)

VISION

Realization of Glimpses of a Golden India in the real(rural) India which lives and abounds in its villages. GNDEC will excel nationally and distinguish itself as a recognized pre-eminent leader to serve this 70% Brotherhood through its socioeconomic upliftment by exposure of the havenots to Engg. & Technology thereby grooming them as technically competent and intellectually-vital Graduates through practically focused quality learning experiences, and thus assuring productive Careers for them.

MISSION

- Upliftment of Rural Students through technical education.

- Respond to local societal needs by developing selected "targeted research projects".

- Quality training programs in need based modern technology.

- To maintain state-of-the-art infrastructure in laboratories.

- To promote culture of self-employment.

- To impart non-formal education to unemployed youth.

- To inculcate moral, ethical, spiritual values in education at all levels.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

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

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

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

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

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

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

The students will be able to:

1. Design and synthesize solutions for engineering problems pertaining to signal processing and communication systems using appropriate tools and research methods.

2. Develop relevant solutions using domain Knowledge with respect to Design, Analysis and implementation in the area of software engineering and computer networking.

3. Identify and apply domain specific tools for design, analysis, synthesis and validation of VLSI and embedded systems.

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA
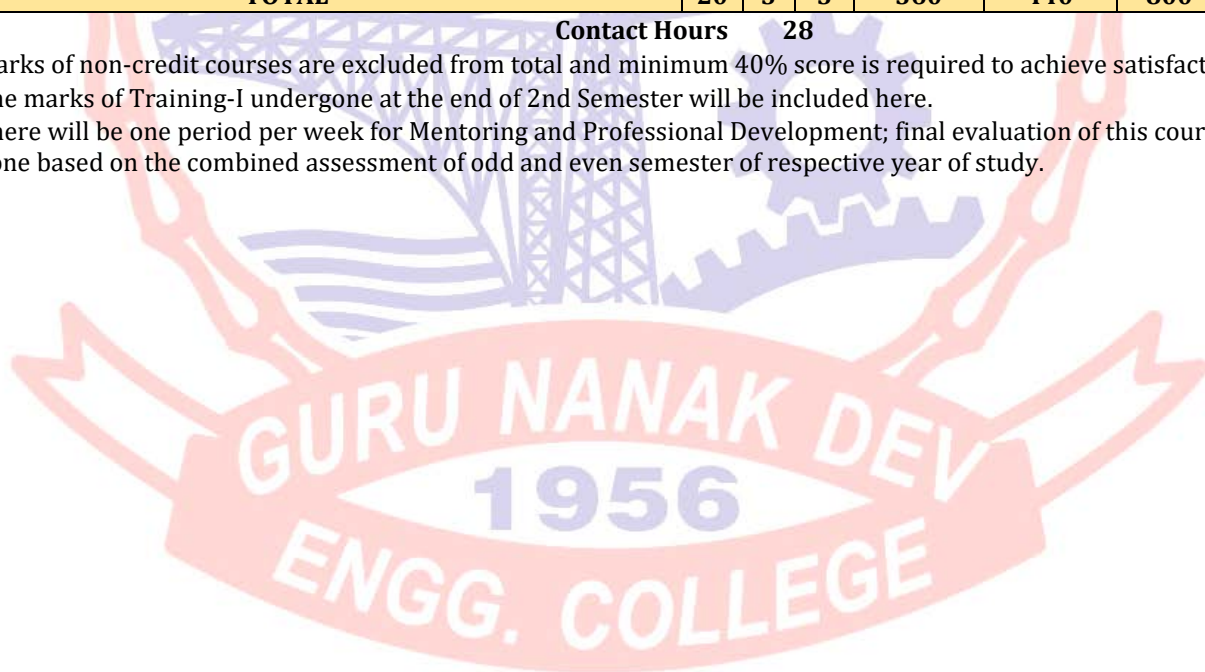## Department of Electronics and Communication Engineering
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S. No.	Course Type	Course Code	Course Title	Subject Type	L	T	P	Internal	External	Total Marks	Credits
					Hours per week			**Marks Distribution**			
1	Basic Science Course	BSEC-101	Engineering Mathematics-III	Theory	3	0	0	40	60	100	3
2	Professional Core Course	PCEC-101	Electronic Devices	Theory	3	0	0	40	60	100	3
3	Professional Core Course	PCEC-102	Network Analysis and Synthesis	Theory	3	1	0	40	60	100	4
4	Professional Core Course	PCEC-103	Signals and Systems	Theory	3	1	0	40	60	100	4
5	Professional Core Course	PCEC-104	Digital Electronics	Theory	3	1	0	40	60	100	4
6	Professional Core Course	PCEC-105	Computer Architecture	Theory	3	0	0	40	60	100	3
7	Mandatory Course (Non-Credit)	MCI-101	Environmental Science *	Theory	2	0	0	50	0	50	S/US
8	Professional Core Course	LPCEC-101	Electronic Devices Laboratory	Practical	0	0	2	30	20	50	1
9	Professional Core Course	LPCEC-102	Digital Electronics Laboratory	Practical	0	0	2	30	20	50	1
10	Training	TR-101	Training-I **	Practical	-	-	-	60	40	100	1
11	Mentoring	-	Mentoring and Professional Development #	Practical	0	0	1	-	-	-	-
	TOTAL				**20**	**3**	**5**	**360**	**440**	**800**	**24**

Contact Hours   28

* Marks of non-credit courses are excluded from total and minimum 40% score is required to achieve satisfactory level.

** The marks of Training-I undergone at the end of 2nd Semester will be included here.

\# There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

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Department of Electronics and Communication Engineering
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S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	T	P	Internal	External		
1	Professional Core Course	PCEC-106	Analog Circuits	Theory	3	1	0	40	60	100	4
2	Professional Core Course	PCEC-107	Object Oriented Programming using C++ and Data Structures	Theory	3	0	0	40	60	100	3
3	Professional Core Course	PCEC-108	Electromagnetic Field Theory	Theory	3	0	0	40	60	100	3
4	Professional Core Course	PCEC-109	Linear Control Systems	Theory	3	1	0	40	60	100	4
5	Humanities and Social Sciences including Management Course	HSMEC-101	Information Management and Data Analytics	Theory	3	0	0	40	60	100	3
6	Professional Core Course	LPCEC-103	Analog Circuits Laboratory	Practical	0	0	2	30	20	50	1
7	Professional Core Course	LPCEC-104	Measurement and Control Laboratory	Practical	0	0	2	30	20	50	1
8	Professional Core Course	LPCEC-105	Object Oriented Programming using C++ and Data Structures Laboratory	Practical	0	0	2	30	20	50	1
9	Professional Core Course	LPCEC-106	Intelligent Signal Processing Laboratory	Practical	0	0	2	30	20	50	1
10	Seminar	PREC-101	Seminar and Technical Report Writing for Engineers	Practical	0	0	2	50	0	50	1
11	Mentoring	MPD-102	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
TOTAL					15	2	11	470	380	850	23

Contact Hours   28

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S. No.	Course Type	Course Code	Course Title	Subject Type	L	T	P	Internal	External	Total Marks	Credits
					Hours per week			**Marks Distribution**			
1	Professional Core Course	PCEC-110	Analog Communication Systems	Theory	3	0	0	40	60	100	3
2	Professional Core Course	PCEC-111	Digital Signal Processing	Theory	3	1	0	40	60	100	4
3	Professional Core Course	PCEC-112	Microprocessors and Microcontrollers	Theory	3	1	0	40	60	100	4
4	Professional Core Course	PCEC-113	Antenna and Wave Propagation	Theory	3	0	0	40	60	100	3
5	Professional Core Course	PCEC-114	Computer Networks	Theory	3	0	0	40	60	100	3
6	Mandatory Course (Non-credit)	MCI-XXX	Open Elective *	Theory	2	0	0	50	0	50	S/US
7	Professional Core Course	LPCEC-107	Analog Communication Systems Laboratory	Practical	0	0	2	30	20	50	1
8	Professional Core Course	LPCEC-108	Digital Signal Processing Laboratory	Practical	0	0	2	30	20	50	1
9	Professional Core Course	LPCEC-109	Microprocessors and Microcontrollers Laboratory	Practical	0	0	2	30	20	50	1
10	Professional Core Course	LPCEC-110	Computer Networks Laboratory	Practical	0	0	2	30	20	50	1
11	Training	TR-102	Training-II **	Practical	-	-	-	60	40	100	1
12	Mentoring	-	Mentoring and Professional Development #	Practical	0	0	1	-	-	-	-
	TOTAL				17	2	9	380	420	800	22

Contact Hours   28

* Marks of non-credit courses are excluded from total and minimum 40% score is required to achieve satisfactory level.
** 1. The marks of Training-II in an Industry/ Institution (viz. IITs/NITs/R&D Labs/ GNDEC only) undergone at the end of 4th Semester will be included here.
2. Each student has to do atleast one project in concerned Industry/ Institution.
There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

List of subjects to be offered as Mandatory Course (Open Elective)

Course Code	Course Title
MCI-102	Constitution of India
MCI-103	Organizational Behaviour

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S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	T	P	Internal	External		
1	Professional Core Course	PCEC-115	Digital Communication Systems	Theory	3	0	0	40	60	100	3
2	Professional Core Course	PCEC-116	Microwave and Radar Engineering	Theory	3	0	0	40	60	100	3
3	Professional Core Course	LPCEC-111	Digital Communication Systems Laboratory	Practical	0	0	2	30	20	50	1
4	Professional Core Course	LPCEC-112	Microwave and Radar Engineering Laboratory	Practical	0	0	2	30	20	50	1
5	Professional Elective Course	PEEC-XXX	Elective-I	Theory	3	1	0	40	60	100	4
6	Professional Elective Course	PEEC-XXX	Elective-II	Theory	3	1	0	40	60	100	4
7	Open Elective Course	OEZZ-XXX	Open Elective-I [1]	Theory	3	0	0	40	60	100	3
8	Professional Elective Course	LPEEC-XXX	Elective-I Laboratory ^	Practical	0	0	2	30	20	50	1
9	Project	PREC-102	Minor Project	Practical	0	0	2	60	40	100	1
10	Mentoring	MPD-103	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
	TOTAL				15	2	9	450	400	850	22

Contact Hours   26

[1] The open elective will be taken by a student offered by other departments, and not by his/her own department.

^ Students will be offered the corresponding Labs from Elective-I Laboratory as per their allotted subject in Elective-I.

Note: -
1. Each student has to undergo Four (04) weeks Training-I/ Training-II/ Training-III in an Industry/ Institution (viz. IITs/NITs/R&D Labs/ GNDEC only) at the end of 2nd/ 4th/ 6th semester respectively.
2. The choices of One Semester Industrial Training in 7th semester (Choice-I) or in 8th semester (Choice-II) or continue with course work in 7th and 8th semester (Choice-III) from the students shall be taken in 6th Semester itself.
3. This Choice-I/ Choice-II of One Semester Industrial Training can be availed only once in 7th semester or in 8th semester respectively.
4. Maximum number of students which will be allowed for One Semester Industrial Training shall not be more than the 50% of the student strength.
5. The preference for choice of one semester industrial training will be given to the students who successfully certified for MOOCS courses (beside for minor/honour degree) of minimum Four (04) weeks/ 12 hours on relevant subjects with additional/ different contents from part of curriculum/problem solving tools/interdisciplinary branch of engineering/technology which have some relevant application during industrial training. These MOOCs courses shall be taken in any semester with the permission of concerned department committee.
6. If choice of one-semester industrial training for particular semester by students exceeds 50%, then following selection criterion will be considered for the students proceeding on industrial training in that particular semester:
Preference-I: CGPA (up to 5th semester) + credits of MOOCs courses (maximum for 2 courses)
Preference-II: CGPA (up to 4th semester) + credits of MOOCs courses (maximum for 2 courses)
Preference-III: CGPA (up to 3rd semester) + credits of MOOCs courses (maximum for 2 courses)
Preference-IV: CGPA (up to 2th semester) + credits of MOOCs courses (maximum for 2 courses)

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S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	T	P	Internal	External		
				Semester-7th							
			Choice-I (For those students who are opting six-month Industrial Training during the 7th Semester)								
1	Training	TR-103	Training-III **	Practical	-	-	-	60	40	100	1
2	Training	TR-104	Industrial Training	Practical	-	-	-	350	150	500	15
TOTAL					**-**	**-**	**-**	**410**	**190**	**600**	**16**

** 1. The marks of Training-III in an Industry/ Institution (viz. IITs/NITs/R&D Labs/ GNDEC only) undergone at the end of 6th Semester will be included here.

2. Each student has to do atleast one project in concerned Industry/ Institution.

\# There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	T	P	Internal	External		
				Semester-8th							
			Choice-I (For those students who are opting six-month Industrial Training during the 7th Semester)								
1	Professional Elective Course	PEEC-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2	Professional Elective Course	PEEC-XXX	Elective-IV	Theory	3	1	0	40	60	100	4
3	Open Elective Course	OEZZ-XXX	Open Elective-II [1]	Theory	3	0	0	40	60	100	3
4	Professional Elective Course	LPEEC-XXX	Elective-III Laboratory ^	Practical	0	0	2	30	20	50	1
5	Project	PREC-105	Major Project ^^	Practical	0	0	6	120	80	200	3
6	Seminar (Non-Credit)	PREC-106	Seminar on Recent Trends in Electronics and Communication	Practical	0	0	2	50	0	50	S/US
7	Mentoring	MPD-104	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
TOTAL					**9**	**2**	**11**	**420**	**280**	**700**	**16**

Contact Hours   22

[1] The open elective will be taken by a student offered by other departments, and not by his/her own department.

^ Students will be offered the corresponding Labs from Elective-III Laboratory as per their allotted subject in Elective-III.

^^ In Major Project the problem related with design/construction/fabrication/computer modeling/experimentation etc. based on specialization group of electives is to be carried out. The results shall be based on theoretical as well as experimental analysis followed by discussion regarding suitability /non suitability of the project or any positive gain in the project. The conclusions and recommendations for future extension of the project must be covered. The evaluation of Major Project will be done as per the rubrics. For writing the report the students have to follow the concerned guidelines.

The Major Project may be carried out by a group of students (2 to 4 from same specialization group).

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Choice-I (Professional Elective Courses and Open Elective Courses)

List of Professional Elective Courses for TRACK-I (Signal Processing and Communication)

Professional Elective Course	Course Code	Course Title
Elective-I	PEEC-101	Optical Communication
	PEEC-105	Cyber Security
Elective-II	PEEC-103	Mobile Communication and Networks
	PEEC-104	Multimedia Signal Processing
Elective-III	PEEC-121	Information Theory and Coding
	PEEC-122	Soft Computing
Elective-IV	PEEC-123	Artificial Intelligence
	PEEC-124	Satellite Communication
Elective-I Laboratory	LPEEC-101	Optical Communication Laboratory
	LPEEC-108	Cyber Security Laboratory
Elective-III Laboratory	LPEEC-111	Information Theory and Coding Laboratory
	LPEEC-112	Soft Computing Laboratory

List of Professional Elective Courses for TRACK-II (VLSI design and Embedded System)

Professional Elective Course	Course Code	Course Title
Elective-I	PEEC-102	ARM based Embedded System
	PEEC-106	RISC Microcontroller Programming and Interfacing
Elective-II	PEEC-107	VLSI Physical Design
	PEEC-108	Digital VLSI Design
Elective-III	PEEC-113	IoT using Raspberry Pi
	PEEC-114	VLSI Design with HDL
Elective-IV	PEEC-115	Introduction to MEMS and Nanotechnology
	PEEC-116	Modern and Future Memories
Elective-I Laboratory	LPEEC-102	ARM based Embedded System Laboratory
	LPEEC-103	RISC Microcontroller Programming and Interfacing Laboratory
Elective-III Laboratory	LPEEC-106	IoT using Raspberry Pi Laboratory
	LPEEC-107	VLSI Design with HDL Laboratory

List of Open Elective Courses offered to all other departments

Open Elective Course	Course Code	Course Title
Open Elective-I	OEEC-101	Signals and Systems
	OEEC-102	Basics of Electronics and Communication
	OEEC-103	Consumer Electronics
	OEEC-110	Secure Communication
Open Elective-II	OEEC-107	Fundamentals of Mechatronics
	OEEC-108	Information and Communication Technologies in Rural Sector
	OEEC-109	Introduction to Neural Networks
	OEEC-112	Engineering Management

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S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	**T**	**P**	**Internal**	**External**		
			Semester-7th								
			Choice-II (For those students who are opting six-month Industrial Training during the 8th Semester)								
1	Professional Elective Course	PEEC-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2	Professional Elective Course	PEEC-XXX	Elective-IV	Theory	3	1	0	40	60	100	4
3	Open Elective Course	OEZZ-XXX	Open Elective-II [1]	Theory	3	0	0	40	60	100	3
4	Professional Elective Course	LPEEC-XXX	Elective-III Laboratory ^	Practical	0	0	2	30	20	50	1
5	Project	PREC-105	Major Project ^^	Practical	0	0	6	120	80	200	3
6	Training	TR-103	Training - III **	Practical	-	-	-	60	40	100	1
7	Seminar (Non-Credit)	PREC-106	Seminar on Recent Trends in Electronics and Communication	Practical	0	0	2	50	0	50	S/US
8	Mentoring	-	Mentoring and Professional Development #	Practical	0	0	1	-	-	-	-
			TOTAL		**9**	**2**	**11**	**380**	**320**	**700**	**16**

Contact Hours   22

[1] The open elective will be taken by a student offered by other departments, and not by his/her own department.

^   Students will be offered the corresponding Labs from Elective-III Laboratory as per their allotted subject in Elective-III.

^^ In Major Project the problem related with design/construction/fabrication/computer modeling/experimentation etc. based on specialization group of electives is to be carried out. The results shall be based on theoretical as well as experimental analysis followed by discussion regarding suitability /non suitability of the project or any positive gain in the project. The conclusions and recommendations for future extension of the project must be covered. The evaluation of Major Project will be done as per the rubrics. For writing the report the students have to follow the concerned guidelines.

The Major Project may be carried out by a group of students (2 to 4 from same specialization group).

** 1. The marks of Training-III in an Industry/ Institution (viz. IITs/NITs/R&D Labs/ GNDEC only) undergone at the end of 6th Semester will be included here.

2. Each student has to do atleast one project in concerned Industry/ Institution.

There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	**T**	**P**	**Internal**	**External**		
			Semester-8th								
			Choice-II (For those students who are opting six-month Industrial Training during the 8th Semester)								
1	Training	TR-104	Industrial Training	Practical	-	-	-	350	150	500	15
2	Mentoring	MPD-104	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
			TOTAL		**-**	**-**	**-**	**450**	**150**	**600**	**16**

Choice-II (Professional Elective Courses and Open Elective Courses)

List of Professional Elective Courses for TRACK I (Signal Processing and Communication)

Professional Elective Course	Course Code	Course Title
Elective-I	PEEC-101	Optical Communication
	PEEC-105	Cyber Security
Elective-II	PEEC-103	Mobile Communication and Networks
	PEEC-104	Multimedia Signal Processing
Elective-III	PEEC-117	Optical Networks
	PEEC-118	Python Programming
Elective-IV	PEEC-119	Cloud Computing
	PEEC-120	Mobile Computing
Elective-I Laboratory	LPEEC-101	Optical Communication Laboratory
	LPEEC-108	Cyber Security Laboratory
Elective-III Laboratory	LPEEC-109	Optical Networks Laboratory
	LPEEC-110	Python Programming Laboratory

List of Professional Elective Courses for TRACK-II (VLSI design and Embedded System)

Professional Elective Course	Course Code	Course Title
Elective-I	PEEC-102	ARM based Embedded System
	PEEC-106	RISC Microcontroller Programming and Interfacing
Elective-II	PEEC-107	VLSI Physical Design
	PEEC-108	Digital VLSI Design
Elective-III	PEEC-109	PLC and Industrial Automation
	PEEC-110	Advanced MOSFET based Structures
Elective-IV	PEEC-111	Analog MOS Integrated Circuit
	PEEC-112	Low Power VLSI Design
Elective-I Laboratory	LPEEC-102	ARM based Embedded System Laboratory
	LPEEC-103	RISC Microcontroller Programming and Interfacing Laboratory
Elective-III Laboratory	LPEEC-104	PLC and Industrial Automation Laboratory
	LPEEC-105	Advanced MOSFET based Structures Laboratory

List of Open Elective Courses offered to all other departments

Open Elective Course	Course Code	Course Title
Open Elective-I	OEEC-101	Signals and Systems
	OEEC-102	Basics of Electronics and Communication
	OEEC-103	Consumer Electronics
	OEEC-110	Secure Communication
Open Elective-II	OEEC-104	Wireless Communication
	OEEC-105	Embedded Systems
	OEEC-106	Fundamentals of Network Security
	OEEC-111	e-Waste Recycling and Management

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S. No.	Course Type	Course Code	Course Title	Subject Type	Hours per week			Marks Distribution		Total Marks	Credits
					L	T	P	Internal	External		
1	Professional Elective Course	PEEC-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2	Professional Elective Course	PEEC-XXX	Elective-IV	Theory	3	1	0	40	60	100	4
3	Open Elective Course	OEZZ-XXX	Open Elective-II [1]	Theory	3	0	0	40	60	100	3
4	Professional Elective Course	LPEEC-XXX	Elective-III Laboratory ^	Practical	0	0	2	30	20	50	1
5	Project	PREC-103	Project-I ^^	Practical	0	0	6	120	80	200	3
6	Training	TR-103	Training - III **	Practical	-	-	-	60	40	100	1
7	Mentoring	-	Mentoring and Professional Development #	Practical	0	0	1	-	-	-	-
			TOTAL		**9**	**2**	**9**	**330**	**320**	**650**	**16**

Semester-7th

Choice-III (For those students who are opting course work during the 7th and 8th semesters)

Contact Hours   20

[1]   The open elective will be taken by a student offered by other departments, and not by his/her own department.

^   Students will be offered the corresponding Labs from Elective-III Laboratory as per their allotted subject in Elective-III.

^^   In Project-I the problem related with design/construction/fabrication/computer modeling/experimentation etc. based on specialization group of electives is to be carried out. The results and analysis followed by discussion regarding suitability /non suitability of the project or any positive gain in the project made with conclusions and recommendations for future extension of the project must be covered. The evaluation of Project-I will be done as per the rubrics. For writing the report the students have to follow the concerned guidelines.
The Project-I may be carried out by a group of students (2 to 4 students from same specialization group). The same project problem may be extended in the Project-II in 8th semester.

**   1. The marks of Training-III in an Industry/ Institution (viz. IITs/NITs/R&D Labs/ GNDEC only) undergone at the end of 6th Semester will be included here.
2. Each student has to do atleast one project in concerned Industry/ Institution.

There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.
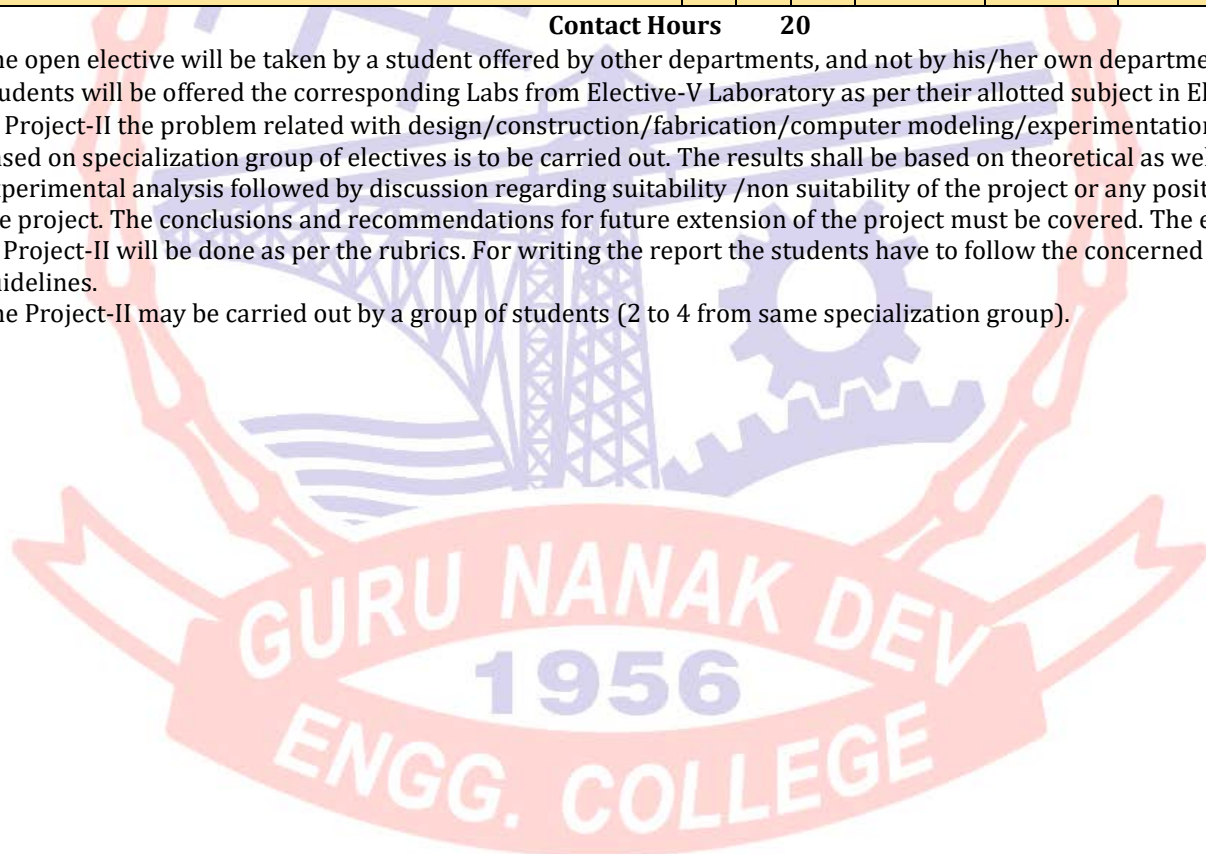
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S. No.	Course Type	Course Code	Course Title	Subject Type	L	T	P	Internal	External	Total Marks	Credits
			Semester-8th								
			Choice-III (For those students who are opting course work during the 7th and 8th semesters)								
1	Professional Elective Course	PEEC-XXX	Elective-V	Theory	3	1	0	40	60	100	4
2	Professional Elective Course	PEEC-XXX	Elective-VI	Theory	3	1	0	40	60	100	4
3	Open Elective Course	OEZZ-XXX	Open Elective-III [1]	Theory	3	0	0	40	60	100	3
4	Professional Elective Course	LPEEC-XXX	Elective-V Laboratory ^	Practical	0	0	2	30	20	50	1
5	Project	PREC-104	Project-II ^^	Practical	0	0	6	120	80	200	3
6	Mentoring	MPD-104	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
	TOTAL				**9**	**2**	**9**	**370**	**280**	**650**	**16**

Contact Hours   20

[1]   The open elective will be taken by a student offered by other departments, and not by his/her own department.

^   Students will be offered the corresponding Labs from Elective-V Laboratory as per their allotted subject in Elective-V.

^^   In Project-II the problem related with design/construction/fabrication/computer modeling/experimentation etc. based on specialization group of electives is to be carried out. The results shall be based on theoretical as well as experimental analysis followed by discussion regarding suitability /non suitability of the project or any positive gain in the project. The conclusions and recommendations for future extension of the project must be covered. The evaluation of Project-II will be done as per the rubrics. For writing the report the students have to follow the concerned guidelines.

The Project-II may be carried out by a group of students (2 to 4 from same specialization group).
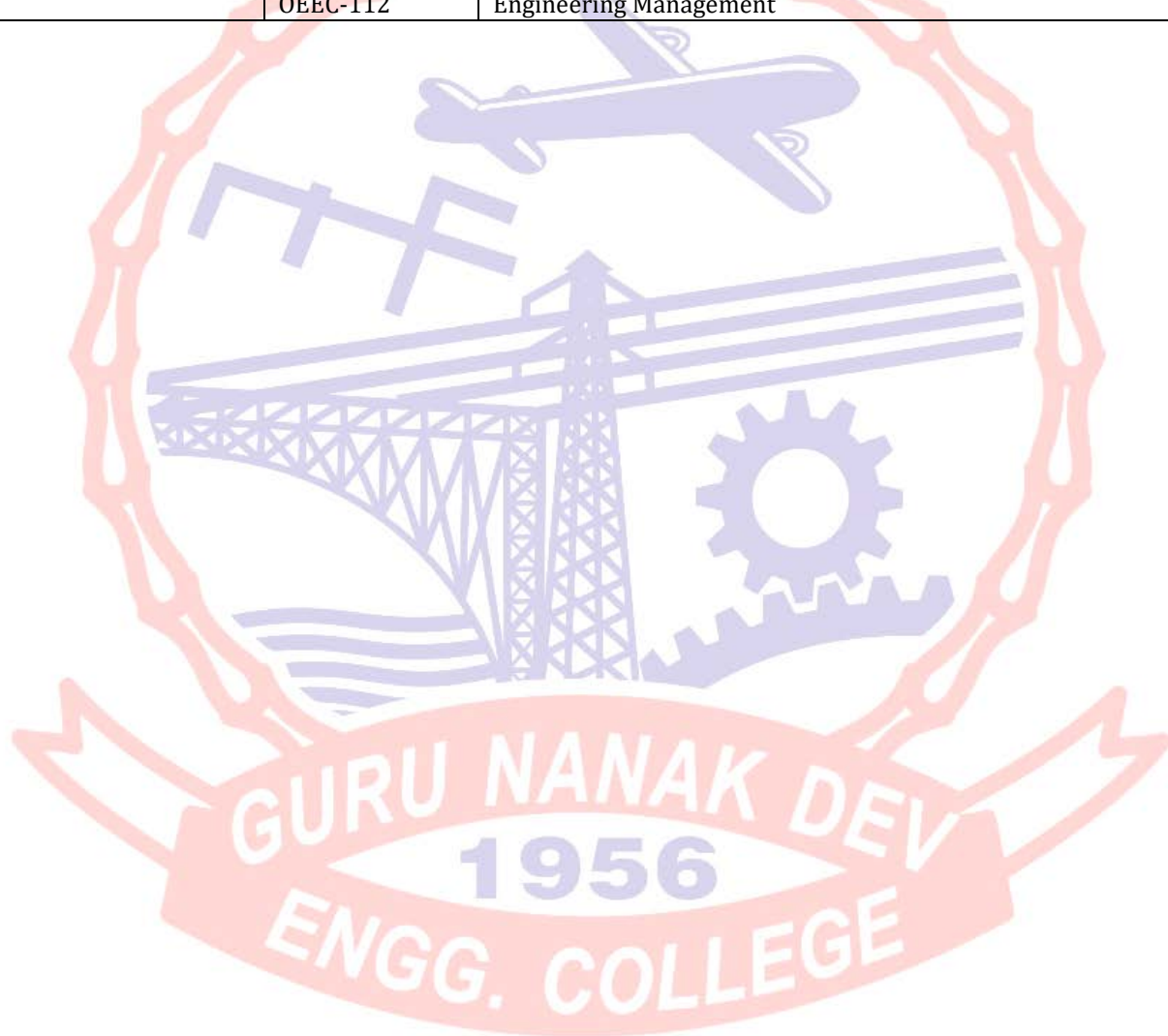
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Choice-III (Professional Elective Courses and Open Elective Courses)

List of Professional Elective Courses for TRACK-I (Signal Processing and Communication)

Professional Elective Course	Course Code	Course Title
Elective-I	PEEC-101	Optical Communication
	PEEC-105	Cyber Security
Elective-II	PEEC-103	Mobile Communication and Networks
	PEEC-104	Multimedia Signal Processing
Elective-III	PEEC-117	Optical Networks
	PEEC-118	Python Programming
Elective-IV	PEEC-119	Cloud Computing
	PEEC-120	Mobile Computing
Elective-V	PEEC-121	Information Theory and Coding
	PEEC-122	Soft Computing
Elective-VI	PEEC-123	Artificial Intelligence
	PEEC-124	Satellite Communication
Elective-I Laboratory	LPEEC-101	Optical Communication Laboratory
	LPEEC-108	Cyber Security Laboratory
Elective-III Laboratory	LPEEC-109	Optical Networks Laboratory
	LPEEC-110	Python Programming Laboratory
Elective-V Laboratory	LPEEC-111	Information Theory and Coding Laboratory
	LPEEC-112	Soft Computing Laboratory

List of Professional Elective Courses for TRACK-II (VLSI design and Embedded System)

Professional Elective Course	Course Code	Course Title
Elective-I	PEEC-102	ARM based Embedded System
	PEEC-106	RISC Microcontroller Programming and Interfacing
Elective-II	PEEC-107	VLSI Physical Design
	PEEC-108	Digital VLSI Design
Elective-III	PEEC-109	PLC and Industrial Automation
	PEEC-110	Advanced MOSFET based Structures
Elective-IV	PEEC-111	Analog MOS Integrated Circuit
	PEEC-112	Low Power VLSI Design
Elective-V	PEEC-113	IoT using Raspberry Pi
	PEEC-114	VLSI Design with HDL
Elective-VI	PEEC-115	Introduction to MEMS and Nanotechnology
	PEEC-116	Modern and Future Memories
Elective-I Laboratory	LPEEC-102	ARM based Embedded System Laboratory
	LPEEC-103	RISC Microcontroller Programming and Interfacing Laboratory
Elective-III Laboratory	LPEEC-104	PLC and Industrial Automation Laboratory
	LPEEC-105	Advanced MOSFET based Structures Laboratory
Elective-V Laboratory	LPEEC-106	IoT using Raspberry Pi Laboratory
	LPEEC-107	VLSI Design with HDL Laboratory

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List of Open Elective Courses offered to all other departments

Open Elective Course	Course Code	Course Title
Open Elective-I	OEEC-101	Signals and Systems
	OEEC-102	Basics of Electronics and Communication
	OEEC-103	Consumer Electronics
	OEEC-110	Secure Communication
Open Elective-II	OEEC-104	Wireless Communication
	OEEC-105	Embedded Systems
	OEEC-106	Fundamentals of Network Security
	OEEC-111	e-Waste Recycling and Management
Open Elective-III	OEEC-107	Fundamentals of Mechatronics
	OEEC-108	Information and Communication Technologies in Rural Sector
	OEEC-109	Introduction to Neural Networks
	OEEC-112	Engineering Management

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List of Subjects for Minor Specialization in Electronics and Communication Engineering

S. No.	Course Code	Course Title	Sem.	Subject Type	L	T	P	Internal	External	Total Marks	Credits
1	MnPCEC-101	Analog Circuits	4	Theory	3	1	0	40	60	100	4
2	MnPCEC-102	Linear Control Systems	4	Theory	3	1	0	40	60	100	4
3	MnPCEC-103	Digital Communication Systems	6	Theory	3	0	0	40	60	100	3
4	MnPCEC-104	Electronic Devices	3	Theory	3	0	0	40	60	100	3
5	MnPCEC-105	Analog Communication Systems	5	Theory	3	0	0	40	60	100	3
6	MnLPCEC-101	Measurement and Control Laboratory	4	Practical	0	0	2	30	20	50	1
7	MnLPCEC-101	Electronic Devices Laboratory	3	Practical	0	0	2	30	20	50	1
8	MnLPCEC-101	Analog Communication Systems Laboratory	5	Practical	0	0	2	30	20	50	1