

Curriculum
for
Bachelor of Science in Electronic Engineering Technology
Degree
(2026)



Higher Education Commission
Islamabad
Curriculum Division

Acronyms, Abbreviations & Definitions

Acronym/ Abbreviation	Definition
HEC	Higher Education Commission
NTC	National Technology Council
NCRC	National Curriculum Review Committee
IDS	Inter-disciplinary Subject
IEA	International Engineering Alliance
MATLAB	Matrix Laboratory
HEI	Higher Education Institution
RIC	Resistance, Inductance, Capacitance
IEEE	Institute of Electrical and Electronics Engineers
SIT	Supervised Industrial Training
LTI	Linear Time-Invariant System
BJT	Bipolar Junction Transistor
MOSFET	Metal–Oxide–Semiconductor Field-Effect Transistor
IGBT	Insulated-Gate Bipolar Transistor
Th.	Theory
Lab.	Laboratory
Cr. Hrs.	Credit Hours
PEO	Program Educational Objectives
PLO	Program Learning Outcome
CLO	Course Learning Outcome
ICT	Information and Communications Technology
CPU	Central Processing Unit
OSI	Open Systems Interconnection



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LAN	Local Area Network
WAN	Wide Area Network
MAN	Metropolitan Area Network
RMS	Root Mean Square
ODEs/Diff.	Ordinary Differential Equations
PCB	Printed Circuit Board
DC	Direct Current
AC	Alternating Current
IDE	Integrated Development Environment
ALU	Arithmetic Logic Unit
CAD	Computer Aided Design
LED	Light Emitter Diode
I/O	Input/Output
LTI	Linear Time-Invariant
PID	Proportional-Integral-Derivative
PLC	Programmable Logic Controller



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Curriculum for Bachelor of Science in Electronic Engineering Technology



Preamble:

The Bachelor of Science in Electronic Engineering Technology (BSEET) curriculum has been developed to prepare competent, innovative, and ethically responsible Engineering Technologists who can meet the evolving needs of industry and society. The curriculum is aligned with the Higher Education Commission (HEC) of Pakistan Undergraduate Education Policy, the National Technology Council (NTC) Pakistan Accreditation Manual and Curriculum Guidelines, and the National Qualifications Framework (NQF) of Pakistan, ensuring compliance with national quality standards and international best practices.

The curriculum is founded on the principles of Outcome-Based Education (OBE) and is aligned with the International Engineering Alliance (IEA) and the Sydney Accord for Engineering Technologists. It is designed to develop graduates who possess strong competencies in engineering technology fundamentals, problem analysis, system design, laboratory investigation, experimentation, modern engineering tools, digital technologies, project implementation, effective communication, teamwork, leadership, ethical and professional practice, project management, sustainability, entrepreneurship, and lifelong learning. These competencies enable graduates to solve broadly defined engineering technology problems while considering technical, economic, environmental, societal, health, safety, legal, and cultural aspects.

Recognizing the transformation of engineering practice in the era of Industry 5.0, the curriculum integrates emerging technologies, including artificial intelligence, Industrial Internet of Things (IIoT), embedded systems, industrial automation, collaborative robotics, digital twins, intelligent instrumentation, industrial cybersecurity, renewable energy technologies, and smart manufacturing. Equal emphasis is placed on human-centric innovation, sustainability, resilience, digital transformation, and interdisciplinary collaboration, preparing graduates to contribute effectively to intelligent and sustainable industrial ecosystems.

Developed through consultation with academia, industry, employers, professional bodies, alumni, and other stakeholders, the curriculum combines a strong foundation in engineering sciences with extensive laboratory work, project-based learning, industrial internships, and capstone design experiences. It equips graduates with the technical knowledge, practical skills, professional competencies, and innovative mindset required to excel in diverse sectors of the electronics industry, pursue higher education and research, support entrepreneurship, and contribute to Pakistan's technological advancement and sustainable socio-economic development.

The curriculum reflects the commitment of HEC and NTC to producing globally competitive Engineering Technologists who are technically proficient, professionally competent, socially responsible, and capable of adapting to rapidly evolving technologies while meeting the Graduate Attributes and Competency Profile prescribed by the International Engineering Alliance's Sydney Accord.



Curriculum for Bachelor of Science in Electronic Engineering Technology



Scope:

The Bachelor of Science in Electronic Engineering Technology program provides comprehensive guidelines that combine sound engineering fundamentals with extensive laboratory experimentation, project-based learning, supervised industrial training, and an industry-oriented capstone project. The curriculum develops competencies in the implementation, integration, operation, testing, maintenance, troubleshooting, and continuous improvement of modern electronic systems while offering opportunities for advanced study in Smart Electronics and Embedded Systems, Industrial Automation and Intelligent Systems, Advanced Electronic and Semiconductor Technologies, and Sustainable Energy and Electric Mobility. Aligned with the NTC framework and the Sydney Accord, the program prepares graduates to design, implement, test, operate, maintain, and troubleshoot modern electronic systems with professionalism, innovation, and ethical responsibility.

Rationale:

The Bachelor of Science in Electronic Engineering Technology program is designed to prepare competent engineering technologists capable of addressing the evolving technological needs of national and global industries. Graduates are equipped with Industry 5.0 practical skills to develop human-centric, sustainable, and digitally enabled engineering solutions. Rapid advancements in smart manufacturing, intelligent automation and sustainable energy systems have created an increasing demand for graduates with interdisciplinary knowledge and application-oriented technical expertise. Developed in accordance with the HEC Undergraduate Education Policy, the NTC Curriculum Framework, and the Sydney Accord, the program prepares graduates to support industrial growth and technological innovation. The program further aims to develop skilled engineering technologists capable of contributing to socio-economic development while meeting the evolving demands of the national and international workforce.



Vision Statement:

To be a globally recognized Electronic Engineering Technology program that delivers excellence in outcome-based education by developing technically competent, innovative, ethical, and industry-ready engineering technologists who drive sustainable technological advancement and contribute to the socio-economic development of society through lifelong learning and professional excellence.

Mission Statement:

To produce globally competent Electronic Engineering Technologists and technopreneurs through quality outcome-based education, applied research, and industry collaboration, equipping them with technical competence, innovation, professionalism, leadership, communication, teamwork, and lifelong learning to solve broadly defined engineering problems and contribute to sustainable technological and societal development.

Program Educational Objectives (PEOs)

PEO 1: Professional Practice

Graduates will establish successful careers as competent Electronic Engineering Technologists or technopreneurs by applying technical knowledge, practical competence, innovation, and engineering management skills to solve broadly defined engineering problems, undertake broadly defined engineering activities, and address evolving industry needs.

PEO 2: Professional Development

Graduates will advance professionally through lifelong learning, continuous professional development, interdisciplinary collaboration, and leadership to adapt to technological advancements and evolving professional practices in industrial, academic, research, or entrepreneurial environments.

PEO 3: Ethical and Societal Contribution

Graduates will demonstrate ethical and professional responsibility by applying sustainable engineering practices and technological solutions that contribute to industrial development, environmental stewardship, and the socio-economic well-being of society.



Curriculum for Bachelor of Science in Electronic Engineering Technology



1. Introduction

The curriculum is the total learning experience of a student that occurs in the educational process. The term refers specifically to a planned sequence of instructions, and to the student's experiences in terms of the educator's or institution's instructional goals. Curriculum is a systematic and intended packaging of competencies (i.e., knowledge, skills, and attitudes, underpinned by values) that learners should acquire through organized learning experiences.

Curriculum forges in learners' lifelong learning competencies, as well as social attitudes and skills, such as tolerance and respect, constructive handling of diversity, peaceful conflict management, promotion and respect of human rights, gender equality, justice, and inclusiveness. At the same time, curriculum must be singularly aligned to national development goals and produce human resources that become an effective factor-of-production in the economy.

Curriculum is thus the foundation on which rests the edifice of academic programs designed for focused outcomes that equip graduates with desired skill sets. Engineering technology curriculum aims to produce proficient engineering technology graduates who meet demands of both national and international job markets. The curriculum conforms substantially to the Sydney Accord – the international accreditation body regulating local accrediting institutions of partnering countries – and is in consonance with the essence of Graduate Attributes and Professional Competence defined by International Engineering Alliance (IEA). [See Appendix A through C].

Curriculum is developed and reviewed by HEC's National Curriculum and Review Committee (NCRC).

2. Curriculum Development Methodology

2.1. Benchmarking

Curriculum for Electronics Engineering Technology is benchmarked to HEC's Undergraduate Policy and in accordance with NTC Curriculum Framework. It conforms substantially to the standards laid out by the Sydney Accord and the International Engineering Alliance pertaining to engineering technology programs [See Appendix A through C].

The course of studies clearly defines and differentiates the program from Electronics Engineering by contact hours spent in classrooms, laboratories, and industry.

2.2. Curriculum Development Cycle

Curriculum development is a rigorous process and entails the following steps:

- Nominations are requested from academic circles and relevant industry forums to constitute a National Curriculum Review Committee (NCRC) comprising of leading national experts.
- From the nominations received, NCRC is finalized and notified by NTC (HEC).
- A preliminary Meeting of the NCRC, spanning three days, is held to establish framework and benchmarking issues, and assign different facets of curriculum development to smaller teams within the NCRC.
- The NCRC Members elect a Convenor, a Co-Convenor, and a Secretary amongst themselves for the proceedings of NCRC, after mutual consultations.
- A draft of program curriculum is prepared by NCRC at the end of the Preliminary Meeting and sent to relevant foreign experts for review and feedback.
- After foreign expert's review, a Final NCRC meeting lasting up to three days is held to finalize the recommendations and prepare final curriculum document.
- The entire cycle of curriculum development is completed in two months.

2.3. Historical Timeline of Meetings

Historical Timeline of NCRC meetings to develop Bachelor of Science in Electronics Engineering Technology are listed below:

- Preliminary Meeting of NCRC [See Appendix D]
- Final Meeting of NCRC [See Appendix E]

3. Curriculum Details

Bachelor of Science in Electronics Engineering Technology Program			
Parameter	HEC Guidelines	Framework - A (SIT in 7th & 8th Semesters)	Framework - B (SIT 8th Semester Only)
Program Type	Semester System	Semester System	Semester System
Program Duration	8 Semesters Min: 4 Years Max: 6 Years	8 Semesters Min: 4 Years Max: 6 Years	8 Semesters Min: 4 Years Max: 6 Years
Semester Duration	16 weeks of Teaching 1-2 weeks for Exams	16 weeks of Teaching 1-2 weeks for Exams	16 weeks of Teaching 1-2 weeks for Exams
Total Number of Courses	-	41	47**
Engineering Technology Domain Courses	-	26	32**
General Education Domain Courses	14	15	15
Total Credit Hours	124 – 148	137	137
Engineering Technology Domain Credit Hours	90-114	103	103
Percentage of Engineering Technology Domain Credit Hours	72.58 % - 77.02 %	75%	75%
Percentage of General Education Domain Credit Hours	27.42 % - 22.97 %	25 %	25 %
General Education Domain Credit Hours	34	34	34
No. of Credit Hours per Semester	15 – 21	15 – 21	15 – 21
** Optional Courses in 7 th Semester shall be included for Framework B (SIT in 8 th Semester only)			
1 credit hour: (1) For theory: 1 contact hour per week for a minimum of 16 weeks for theory. (2) For practical: 3 contact hours per week for a minimum of 16 weeks for practical.			

Engineering Technology Domain Courses in Recommended Schemes of Studies as per Framework							
Knowledge Area	Name of Course	Credit Hours (Th+Lab)	Weekly Contact Hours (Th+Lab)	Total Credit Hours		Number of Courses	
				As per Scheme of Studies	HEC Guideline	As per Scheme of Studies	HEC Guideline
Electronics Engineering Technology (Foundation)	Workshop Practice	0+1=1	0+3=3	16	-	6	-
	Linear Circuit Analysis	2+1=3	2+3=5				
	Electrical Network Analysis	2+1=3	2+3=5				
	Digital Electronics	2+1=3	2+3=5				
	Electronic Devices & Circuits	2+1=3	2+3=5				
	Signals and Systems	2+1=3	2+3=5				
Electronics Engineering Technology (Breadth)	Instrumentation and Measurements	2+1=3	2+3=5	18	-	6	-
	Electrical Machines	2+1=3	2+3=5				
	Amplifiers and Oscillators	2+1=3	2+3=5				
	Microprocessors and Microcontrollers	2+1=3	2+3=5				
	Control Systems	2+1=3	2+3=5				
	Communication Systems	2+1=3	2+3=5				
Electronics Engineering Technology (Depth)	Industrial Automation	1+1=2	1+3=4	18	-	7	-
	Industrial Electronics	1+1=2	1+3=4				
	VLSI Technology	2+1=3	2+3=5				
	Electronics Troubleshooting and Repair	0+2=2	0+6=6				
	Power Electronics	2+1=3	2+3=5				
	Depth Elective-I	2+1=3	2+3=5				
	Depth Elective-II	2+1=3	2+3=5				
Interdisciplinary Subjects	AI for Electronics Technology	2+1=3	2+3=5	13	12	5	-
	Computer Programming	1+1=2	1+3=4				
	Differential Equations	2+0=2	2+0=2				
	IDS-I	2+1/3+0=3	2+3=5/3+0=3				
	IDS-II	2+1/3+0=3	2+3=5/3+0=3				
Capstone Project	Capstone Project Part-I	0+3=3	0+9=9	6	6	2	2
	Capstone Project Part-II	0+3=3	0+9=9				
Training	Supervised Industrial Training- (Framework-A only)	0+16=16	0+16=16	16		0	
	Supervised Industrial Training- (Framework-A & Framework-B*)	0+16=16	0+16=16	16		0	
Total Credit Hours and Courses (For Engineering Technology Domain Courses)		41+62 = 103	41+186= 227	26 – 32**		90-114	

Notes:

***Framework-B:** Students shall complete 16 credit hours of coursework in the 7th semester and SIT (16 credit hours) in the 8th semester, with an additional 16 credit hours of supplementary courses required in the 7th semester.

General Education Domain Courses in Recommended Schemes of Studies as per Framework								
Knowledge Area	Sub-Area	Name of Course	Credit Hours (Th+Lab)	Weekly Contact Hours (Th+Lab)	Total Credit Hours		Number of Courses	
					As per Scheme of Studies	HEC Guidelines	As per Scheme of Studies	HEC Guidelines
Humanities and Social Sciences	English	Functional English	3+0=3	3+0=3	6	6	2	2
		Expository Writing	3+0=3	3+0=3				
	Culture	Islamic Studies / Ethics	2+0=2	2+0=3	8	8	5	5
		Pakistan Studies	2+0=2	2+0=3				
		Ideology & Constitution of Pakistan	2+0=2	2+0=2				
		Fehm e Quran-I / Any course of GE for Non-Muslims	0+1=1	0+3=3				
		Fehm e Quran-II / Any course of GE for Non-Muslims	0+1=1	0+3=3				
	Social Sciences	Civics and Community Engagement	2+0=2	2+0=2	2	2	1	1
		Elective-I	2+0=2	2+0=2	2	2	1	1
	Arts & Humanities	Elective-I	2+0=2	2+0=2	2	2	1	1
Management Sciences	Management Sciences	Technopreneurship	2+0=2	2+0=2	2	2	1	1
Natural Sciences	Math (Quantitative Reasoning)	Quantitative Reasoning-I	3+0=3	3+0=3	6	6	2	2
		Quantitative Reasoning-II	3+0=3	3+0=3				
	Physics	Applied Physics	2+1=3	2+3=5	3	3	1	1
Computing	Computing	Applications of ICT	2+1=3	2+3=5	3	3	1	1
Total Credit Hours and Courses (For General Education Domain Courses)					Cr. Hrs. 34		Courses 15	

List of Elective Subjects	
Social Sciences	Arts & Humanities
❖ Professional Ethics ❖ Sociology for Technologist ❖ Critical Thinking ❖ Organizational Behavior ❖ Professional Psychology and Human Behavior ❖ Elective Courses by HEI*	❖ Philosophy ❖ History of South Asia ❖ Introduction to Foreign Language and Culture ❖ Urdu Literature ❖ English Literature ❖ Art & Aesthetics ❖ Media and Communication Studies ❖ Muslim Heritage ❖ Risk and Disaster Management ❖ Comparative Religion ❖ Cultural Anthropology ❖ Elective Courses by HEI*
Depth	Interdisciplinary Subjects
❖ Embedded System and IoT Applications ❖ Renewable Energy Integration ❖ Electric Vehicle Technology ❖ FPGA-based Technology ❖ Integrated Circuits Fabrication ❖ Electromagnetic Field Theory ❖ Opto-Electronic Devices & Technology ❖ Microwave Electronics ❖ Computer Architecture ❖ Robotics Technology ❖ Digital Signal processing ❖ Nanotechnology ❖ Elective Courses by HEI*	❖ Applied Mechanics ❖ Applied Thermodynamics ❖ Software Engineering Technology ❖ Mobile Application Development ❖ Web Development Technologies ❖ Operating System ❖ Wireless Sensor Networks ❖ Computer Vision ❖ Biomedical Instrumentation ❖ Introduction to Data Science ❖ Manufacturing Processes ❖ Cloud Computing ❖ Numerical Methods ❖ Solid State Physics ❖ Semiconductor Physics ❖ Genetics ❖ Applied Chemistry ❖ Economics for Technologist ❖ Digital Marketing ❖ Leadership and Conflict Management ❖ Operations Management ❖ Supply Chain Management ❖ Total Quality Management ❖ Production Management ❖ Asset Management ❖ Digital Freelancing ❖ Organizational Behavior ❖ Accrual Science ❖ Accounting for Technologists ❖ International Business ❖ E-Business ❖ Elective Courses by HEI*
* This list of electives is non-exhaustive; any related course can be included with approval of the HEI's Statutory Bodies	

4. Admission Criteria

Criteria for admission to Bachelor of Science in Electronics Engineering Technology program is defined in NTC's Program Accreditation Policy and Procedures Manual for Engineering & Other Technologies, Clause 3.2.4.1. Salient features for eligibility for admission are:

(1) Academic Qualification

Candidates must have secured at least 50% marks in one of the following or equivalent qualifications:

- i. DAE
- ii. FSc (Pre-Engineering/Pre-Medical)
- iii. ICS
- iv. A-Levels (with equivalence from IBCC)
- v. DIT (Diploma in IT endorsed by NTC)
- vi. Any other equivalent qualification

Note: Marks awarded for Hafiz-e-Quran or sports achievements shall not be included in the merit calculation.

(2) Entrance Test: Candidates are required to qualify for an entry/aptitude test as prescribed by the university/concerned authority

(3) Merit Determination (Weightage)

- 70% for academics (DAE/FSc or equivalent)
- 30% for Entrance Test

Note:

(1) Reserved quotas (if any) shall be applied as per NTC/HEC policies

(2) Equivalence certificates (for A-Levels or foreign qualifications) must be provided at the time of admission

5. Semester-wise Scheme of Studies

Semester-wise scheme of studies for the Bachelor of Science in Electronics Engineering Technology program spans 4 years, spread over 8 semesters, and totaling 137 credit hours is presented below along with weekly contact hours for each course.

Semester – I				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EEH-111	Functional English	General Education	3+0	3+0
EEN -111	Quantitative Reasoning-I	General Education	3+0	3+0
EEH-112	Islamic Studies /	General Education	2+0	2+0
EEH-113	Ethics			
EEN-112	Applied Physics	General Education	2+1	2+3
EEC-111	Applications of Information and Communication Technology	General Education	2+1	2+3
EET-111	Linear Circuit Analysis	Engineering Technology Foundation	2+1	2+3
EET-112	Workshop Practices	Engineering Technology Foundation	0+1	0+3
Subtotal			14+4=18	14+12=26
Semester – II				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EEE-121	Expository Writing	General Education	3+0	3+0
EEN-121	Differential Equations	Interdisciplinary Subjects	2+0	2+0
EEH-121	Pakistan Studies	General Education	2+0	2+0
EEH-122	Fehm e Quran-I / Any course of GE for Non-Muslims	General Education	0+1	0+3
EET-123	Electronic Devices & Circuits	Engineering Technology Foundation	2+1	2+3
EET-122	Digital Electronics	Engineering Technology Foundation	2+1	2+3
EEI-121	Computer Programming	Interdisciplinary Subjects	1+1	1+3
Subtotal			12+4=16	12+12=24
Semester – III				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET-211	Electrical Network Analysis	Engineering Technology Foundation	2+1	2+3
EEN-211	Quantitative Reasoning-II	General Education	3+0	3+0
EEH-212	Fehm e Quran-II / Any course of GE for Non-Muslims	General Education	0+1	0+3
EES-212	Ideology & Constitution of Pakistan	General Education	2+0	2+0
EEI-211	AI for Electronics Technology	Interdisciplinary Subjects	2+1	2+3
EET-213	Instrumentation and Measurements	Engineering Technology Breadth	2+1	2+3
EET-212	Signals and Systems	Engineering Technology Foundation	2+1	2+3
Subtotal			13+5=18	13+15=28



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Semester – IV				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET-221	Electrical Machines	Engineering Technology Breadth	2+1	2+3
EEH-221	Civics and Community Engagement	General Education	2+0	2+0
EEI-XXX	IDS-I	Interdisciplinary Subjects	2+1/3+0	2+3/3+0
EET-223	Amplifiers and Oscillators	Engineering Technology Breadth	2+1	2+3
EET-224	Microprocessors and Microcontrollers	Engineering Technology Breadth	2+1	2+3
EET-225	Control Systems	Engineering Technology Breadth	2+1	2+3
Subtotal			12+5/13+4 =17	12+15/13+12 =27/25
Semester – V				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET-311	Communication Systems	Engineering Technology Breadth	2+1	2+3
EES-XXX	Social Sciences (Elective)	General Education	2+0	2+0
EEN-311	Arts & Humanities (Elective)	General Education	2+0	2+0
EEM-311	Technopreneurship	General Education	2+0	2+0
EEI-XXX	IDS-II	Interdisciplinary Subjects	2+1/3+0	2+3/3+0
EET-313	Electronics Troubleshooting and Repair	Engineering Technology Depth	0+2	0+6
EET-312	Industrial Electronics	Engineering Technology Depth	1+1	1+3
EET-314	Capstone Project-I	Project	0+3	0+9
Subtotal			11+8/12+7 =19	11+24/12+21 =35/33
Semester – VI				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET-321	VLSI Technology	Engineering Technology Depth	2+1	2+3
EET-322	Industrial Automation	Engineering Technology Depth	1+1	1+3
EET-323	Power Electronics	Engineering Technology Depth	2+1	2+3
EET-XXX	Depth Elective-I	Engineering Technology Depth	2+1	2+3
EET-XXX	Depth Elective-II	Engineering Technology Depth	2+1	2+3
EET-324	Capstone Project-II	Project	0+3	0+9
Subtotal			9+8 =17	9+24=33

Semester – VII (Framework-A)				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET-411	Supervised Industrial Training (Optional)	Electronics Engineering Technology Domain Industrial Training	16	48
Subtotal			0+16= 16	0+48= 48
Semester – VII (Framework-B)				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET- XXX	Renewable Energy Integration	Depth	3+1	3+3
EET- XXX	Depth Elective-III	Depth	2+1	2+3
EET- XXX	Depth Elective-IV	Depth	2+1	2+3
EET- XXX	Depth Elective-V	Depth	2+1	2+3
EET- XXX	Depth Elective-VI	Depth	2+1	2+3
Subtotal			11+5=16	11+15=26
Semester – VIII				
Suggested Course Codes	Course Title	Knowledge Area/Domain	Credit Hrs. (Th+Lab)	Weekly Contact Hrs. (Th+Lab)
EET-421	Supervised Industrial Training	Electronics Engineering Technology Domain Industrial Training	16	48
Subtotal			0+16= 16	0+48= 48
Total Credit Hours & Contact Hours in Four Years (Framework - A)			137	269
Theory vs Practical with respect to Contact Hours			Theory / Practical	(26.39%) / (73.61%)
Total Credit Hours & Contact Hours in Four Years (Framework - B)			137	247
Theory vs Practical with respect to Contact Hours			Theory / Practical	(33.20%) / (66.80%)

6. Course Codes

Details pertinent to course codes are presented below:

- Each course has a unique three-letter prefix, followed by three-digit code.
- Letters are acronyms for course description, and numbers define the chronological position in the academic year and sequence number in the program.
- The program spans four years, with 2 semesters per year, Spring and Fall (with possible inclusion of Summer Semester).

Letters in course-code prefix are defined below:

- First two letters pertain to the program (e.g., EE for Electronic Engineering)
- Third letter pertains to specifics of the course (e.g., T for technology, E for expository writing etc.)

Digits in course-codes are defined in table below:

1st Digit	2nd Digit	3rd Digit
Denotes Year (1,2,3,4)	Denotes Semester (1,2,3)	Denotes Sequence (1, 2, 3...)

Course Code Examples		
Sr. No.	Course Code Prefix	Description
1	EET	Electronics Engineering Technology Foundation/ Breadth/ Depth
2	EEE	Expository Writing
3	EEH	Art & Humanities
4	EES	Social Sciences
5	EEQ	Quantitative Reasoning
6	EEN	Natural Sciences
7	EEC	Computing
8	EEM	Management Sciences
9	EET	Interdisciplinary Subjects



7. Course Contents

The Primary goal of this curriculum is to be substantially in compliance with national and international standards set by relevant agencies such as the Higher Education Commission (HEC) Pakistan and the International Engineering Alliance (IEA) & the Sydney Accord.

Program Learning Outcomes (PLOs), Course Learning Outcomes (CLOs) and Bloom's Taxonomy levels are expected learning outcomes and are aligned to standards set by the Sydney Accord and international Engineering Alliance.

7.1. General Education Course Contents:

(Course Code) and Title (EEC-111) Applications of ICT		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals) SK7 (Knowledge)		Range of Problem Identification & Solving: SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of analysis required)	Range of Engineering Activities TA-1(Range of resources) TA-3 (Innovation) TA-4(Consequences to society and the environment) TA-5(Familiarity)
Sustainable Development Goals (SDGs) SDG-9		Professional Competence Profile TC-1 (Comprehend and apply universal knowledge) TC-4 (Design and development of solutions) TC-7 (Legal, regulatory, and cultural) TC-12 (Judgement)	
Course Objectives			
This course is designed to provide students with an exploration of the practical applications of Information and Communication Technologies (ICT) and software tools in various domains. Students will gain hands-on experience with a range of software applications, learning how to leverage ICT to solve daily life problems, enhance productivity and innovate in different fields. Through individual and interactive exercises and discussions, students will develop proficiency in utilizing software for communication, creativity, and more.			
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:		Taxonomy (Level)
CLO-1	Explain the fundamental concepts and applications of ICT in various domains.		C-2
CLO-2	Apply ICT solutions to solve real-world problems in academic and professional contexts.		C-3
CLO-3	Exhibit ethical behavior and responsible digital citizenship in ICT usage.		A-3
CLO-4	Demonstrate effective use of ICT tools for communication, productivity, and collaboration.		P-3
CLO-5	Demonstrate responsible and ethical use of ICT tools by adhering to digital etiquette, avoiding plagiarism, and ensuring data integrity in all lab activities.		A-3
Course Outline for Theory			

1. Introduction to Information and Communication Technologies (ICT):

- Components of information and communication technologies (Basic of Hardware, Software, ICT platform, networks, local and Cloud Data Storage etc.)
- Scope of information and communication technologies (uses of ICT in Education, Business, Governance, Health Care, Digital Media and Entertainment etc.)
- Emerging technologies and future trends.

2. Basic ICT Productivity Tools:

- Effective uses of popular search engines (e.g., Google Bing etc.)
- Formal communication tools etiquettes (Gmail, Microsoft, Outlook, etc.)
- Microsoft office suites (Word, Excel, PowerPoint)
- Google workspace (Google Docs, Sheets, Slides)
- Dropbox (cloud storage and file sharing), Google Drive (cloud storage and Google drive integration), and Microsoft One Drive (cloud storage with Microsoft office integration)
- Evernote (Note-taking and organization applications) and One Note (Microsoft digital notebook for capturing and organizing ideas).
- Video conferencing (Google Meet, Microsoft Teams, Zoom etc.).
- Social media applications (LinkedIn, Facebook, Instagram etc.).

3. ICT in Education

- Working with learning management systems (Moodle, canvas, Google classrooms etc.)
- Source of online education courses (courser, edX, Udemy Khan Academy, etc.)
- Interactive multimedia and virtual classrooms.

4. ICT in Health and Well- Being:

- Health and fitness tracking devices and applications (Google Fit, Samsung Health, Apple Health and Xiaomi Mi Band, run keeper etc.)
- Telemedicine and online health consultation (OLADOC, Sehat Kahani, Marham etc.)

5. Digital Citizenship and Online Etiquette:

- Digital Identity and online reputation.
- Netiquettes and respectful online communication.
- Cyberbullying and online harassment.

6. ICT in Personal Finance and Shopping:

- Online banking and financial management tools
- E-commerce platforms

7. Ethical Considerations in Use of ICT Platform and Tool:

- Intellectual property and copy right issues.
- Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources.
- Content accuracy and integrity (ensuring that the content shared ICT platform is free from misinformation, fake news and manipulation).

Lab Work Outline for Practical

The course emphasizes hands-on experience with widely used software tools, cloud platforms, communication systems, and digital services. It also develops awareness of ethical, social, and legal implications of ICT use, including digital citizenship, cybersecurity, and responsible content creation. By the end of the course, students will be able to effectively utilize ICT tools to enhance productivity, solve real-world problems, and participate responsibly in a digital society.

Lab experiments may be based on:

- Introduction to ICT: Concepts, Components (Hardware, Software, Networks)
- Scope of ICT: Applications in Education, Business, Governance
- Emerging Trends: AI, IoT, Cloud, Digital Transformation
- Email Communication & Professional Etiquettes
- Ethical Issues: Copyright, Plagiarism, Fake News

RECOMMENDED BOOKS

1. "Discovering Computers" by Vermaat, Shaffer, and Freund.
2. "GO! With Microsoft Office" Series by Gaskin, Vargas, and McLellan.
3. "Exploring Microsoft Office" Series by Grauer and Poatsy.
4. "Computing Essentials" by Morley and Parker.
5. "Technology in Action" by Evans, Martin and Poatsy.

(Course Code) and Title (EEN-112) Applied Physics		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK1 (Natural and Social Sciences)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP3 (Depth of analysis required)	Range of Engineering Activities TA-1(Range of resources) TA-5(Familiarity)
Sustainable Development Goals (SDGs) SDG-9		Professional Competence Profile TC-1 (Comprehend and apply universal knowledge) TC-3 (Problem analysis) TC-4 (Design and development of solutions)	
Course Objectives			
This course is designed to provide Engineering Technology students with a practical and application-oriented understanding of fundamental concepts in electricity and magnetism. It focuses on how physical principles are applied in real-world engineering technology systems such as electrical circuits, electronic devices, industrial equipment, and measurement systems. The course bridges theory with practice by emphasizing problem-solving, numerical analysis, and laboratory experimentation. Students will develop the ability to interpret physical phenomena, use measurement instruments, and apply scientific principles to troubleshoot and optimize engineering systems. The course also instills safe laboratory practices and professional responsibility in handling electrical equipment.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain principles of electricity and magnetism relevant to engineering technology systems.	C-2	PLO-1/SA-1
CLO-2	Apply physical laws (Ohm’s Law, Gauss’s Law, Faraday’s Law) to solve practical engineering technology problems.	C-3	PLO-3/SA-3
CLO-3	Analyze electrical and magnetic circuits to evaluate system behavior and performance.	C-4	PLO-2/SA-2
CLO-4	Perform experiments to verify physical laws related to electricity and magnetism using standard laboratory equipment.	P-3	PLO-5/SA-5
CLO-5	Analyze experimental data and interpret results to validate theoretical concepts.	P-3	PLO-2/SA-2
Course Outline for Theory			
Electric charge, Conductors and insulators, Coulomb’s law, Electric field, Field due to a point-charge Electric dipole and line of charge, Flux of an electric field, Permittivity of a medium, Gauss's law, Application of Gauss's Law, Electric potential, calculating the potential from electric field, Potential due to a point-charge and a group of point-charges. Potential due to a dipole, Potential due to a continuous charge distribution, Capacitors, calculating capacitance, Capacitors in series and parallel, Factors affecting capacitance, Application of Capacitors, Current and Conductors, Electric current and current density, Resistance and resistivity, Ohm’s law, The Steady Magnetic Field, Resistors in series and parallel, Temperature dependence of resistance and other factors affecting resistance, Application of resistors, the magnetic field, Magnetic force on a current carrying conductor, Torque on a current-loop, Magnetic field due to current, Force between two parallel current-carrying conductors, Biot Savart law and its applications, Ampere’s law, Inductance and inductors, Factors affecting inductance Permeability Faraday’s law of induction, Lenz’s law, Energy stored in a magnetic field, Self-induction, Mutual Induction, Magnets and magnetic materials, Di-magnetic			

material, Para-magnetic material, Ferromagnetism.

Lab Work Outline for Practical

Lab experiments may be based on (but not limited to):

- Verification of Coulomb's Law Using Electrostatic Apparatus
- Measurement of Electric Potential and Electric Field Distribution
- Determination of Capacitance in Series and Parallel Circuits
- Verification of Ohm's Law and Determination of Resistance
- Study of Magnetic Field Around a Current-Carrying Conductor
- Verification of Faraday's Law of Electromagnetic Induction

RECOMMENDED BOOKS

1. "Fundamentals of Physics" by Halliday, Resnick and Walker, (Latest Edition)
2. "University Physics" by Hugh D. Young and R.A. Freedman, (Latest Edition)
3. "Physics for Scientists and Engineers with modern Physics" by Raymond A Serway and John W. Jewett, Jr. (Latest Edition)
4. "Fundamentals of Electromagnetic Phenomenon" by D. Corson & Lorrain, (Latest Edition)

(Course Code) and Title (EEM-311) Technopreneurship		Credit Hours (2+0)	Pre-Requisite None	
Knowledge & Attitude Profile SK5 (Engineering Design and Operations) SK7 (Knowledge) SK9 (Ethics)		Range of Problem Identification & Solving -		Range of Engineering Activities -
Sustainable Development Goals (SDGs) -			Professional Competence Profile TC-1 (Comprehend and apply universal knowledge) TC-3 (Problem analysis) TC-4 (Design and development of solutions) TC-10 (Communication and Collaboration)	
Course Objectives				
This course introduces Engineering Technology students to the principles and practices of technopreneurship, focusing on the creation, development, and management of technology-driven ventures. It bridges technical knowledge with entrepreneurial skills, enabling students to transform innovative ideas into viable business solutions. The course emphasizes opportunity recognition, innovation, business model development, startup financing, digital platforms, and commercialization strategies. Students will learn to evaluate market needs, develop value propositions, and prepare business plans for technology-based products or services. The course also fosters creativity, risk awareness, ethical responsibility, and teamwork—essential traits for technologists entering modern innovation ecosystems				
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain key concepts of technopreneurship, innovation, and technology-based business models.		C-2	PLO-1/SA-1
CLO-2	Apply entrepreneurial models (e.g., business model canvas, feasibility analysis) to evaluate technology-based opportunities.		C-3	PLO-3/SA-3
CLO-3	Analyze market needs, customer requirements, and business viability for technology ventures.		C-4	PLO-2/SA-2
CLO-4	Demonstrate entrepreneurial mindset, teamwork, and communication skills through development and presentation of a business idea.		A-3	PLO-8/SA-8
Course Outline for Theory				

- Introduction to Technopreneurship and Innovation
- Role of Technology in Entrepreneurship
- Creativity and Idea Generation Techniques
- Opportunity Identification and Feasibility Analysis
- Design Thinking and Problem-Solving
- Business Models (e.g., Lean Canvas, Value Proposition)
- Market Research and Customer Validation
- Product Development and Prototyping Concepts
- Digital Transformation and Platform-based Businesses
- Startup Financing and Funding Sources
- Costing, Pricing, and Revenue Models
- Legal, Ethical, and Intellectual Property Issues
- Marketing Strategies for Tech Startups
- Operations and Scaling of Ventures
- Pitching and Business Communication
- Case Studies of Successful Tech Startups

Recommended Books

1. "Technology Entrepreneurship: Creating, Capturing, and Protecting Value" by Thomas N. Duening, Robert D. Hisrich, and Michael A. Lechter, Academic Press (Elsevier), Latest Edition.
2. "The Lean Startup" by Eric Ries, Crown Business Publisher, Latest Edition.
3. "Business Model Generation" by Alexander Osterwalder and Yves Pigneur, Wiley Publisher, Latest Edition.

(Course Code) and Title (EEH-221) Civics and Community Engagement		Credit Hours (2+0)	Pre-Requirement None
Knowledge & Attitude Profile SK1 (Natural and Social Sciences) SK7 (Knowledge) SK9 (Ethics)		Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -		Professional Competence Profile TC-6 (Protection of society) TC-7 (Legal, regulatory, and cultural) TC-8 (Ethics) TC-11 (Continuing Professional Development and Lifelong Learning)	
Course Objectives			
This course is designed to provide students with fundamental knowledge about civics, citizenship, and community engagement. Students will learn about the essentials of civil society, government, civic responsibilities, inclusivity, and effective ways to participate in shaping the society which will help them apply theoretical knowledge to the real-world situations to make a positive impact on their communities.			
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain the concepts of civics, citizenship, and ethical responsibilities in society.	C-2	PLO-7/SA-7
CLO-2	Analyze the role of community engagement in addressing societal and sustainability issues.	C-4	PLO-6/SA-6
CLO-3	Participate effectively in team-based community activities demonstrating inclusivity and collaboration.	C-3	PLO-8/SA-8



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CLO-4	Reflect on personal civic responsibilities and demonstrate commitment to continuous learning and community involvement.	C-5	PLO-11/SA-11
Course Outline for Theory			
Civics and Citizenship (Concepts of civics, citizenship, and civic engagement; Foundations of modern society and citizenship; Types of citizenship: active, participatory, digital, etc.) State, Government and Civil Society (Structure and functions of government in Pakistan; The relationship between democracy and civil society; Right to vote and importance of political participation and representation.) Rights and Responsibilities (Overview of fundamental rights and liberties of citizens under Constitution of Pakistan 1973; Civic responsibilities and duties; Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.) Community Engagement (Concept, nature and characteristics of community; Community development and social cohesion; Approaches to effective community engagement; Case studies of successful community driven initiatives.) Advocacy and Activism (Public discourse and public opinion; Role of advocacy in addressing social issues; Social action movements.) Digital Citizenship and Technology (The use of digital platforms for civic engagement; Cyber ethics and responsible use of social media; Digital divides and disparities (access, usage, socioeconomic, geographic, etc.) and their impacts on citizenship.) Diversity, Inclusion and Social Justice (Understanding diversity in society (ethnic, cultural, economic, political etc.); Youth, women and minorities' engagement in social development; Addressing social inequalities and injustices in Pakistan; Promoting inclusive citizenship and equal rights for societal harmony and peaceful coexistence.)			
RECOMMENDED BOOKS			
"Civics Today: Citizenship, Economics, & You" by McGraw-Hill Education. "Citizenship in Diverse Societies" by Will Kymlicka and Wayne Norman. "Engaging Youth in Civic Life" by James Youniss and Peter Levine. "Digital Citizenship in Action: Empowering Students to Engage in Online Communities" by Kristen Mattson. "Globalization and Citizenship: In the Pursuit of a Cosmopolitan Education" by Graham Pike and David Selby.			

(Course Code) and Title (EES-212) Ideology and Constitution of Pakistan	Credit Hours (2+0)	Pre-Requisite None
Knowledge & Attitude Profile SK1 (Natural and Social Sciences) SK9 (Ethics)	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -	Professional Competence Profile TC-1 (Comprehend and apply universal knowledge) TC-6 (Protection of society) TC-7 (Legal, regulatory, and cultural)	
Course Objectives		
This course is designed to provide students with a fundamental exploration of the ideology and the constitution of Pakistan. The course focuses on the underlying principles, beliefs, and aspirations that have been instrumental in shaping the creation and development of Pakistan as a sovereign state. Moreover, the course will enable students to understand the core provisions of the Constitution of the Islamic Republic of Pakistan concerning the fundamental rights and responsibilities of Pakistani citizens to enable them to function in a socially responsible manner.		
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:	Taxonomy (Level) Program Learning Outcomes (PLO)

CLO-1	Demonstrate enhanced knowledge of the ideological basis of Pakistan with reference to the contributions of founding leaders.	C-2	PLO-7/SA-7
CLO-2	Demonstrate fundamental knowledge of the 1973 Constitution of Pakistan and its evolution with emphasis on state structure	C-2	PLO-1/SA-1
CLO-3	Explain the guiding principles of rights and responsibilities of Pakistani citizens as defined in the Constitution.	C-3	PLO-6/SA-6
Course Outline for Theory			
1. Introduction to the Ideology of Pakistan: • Definition and significance of ideology. • Historical context of the creation of Pakistan (with emphasis on socio-political, religious, and cultural dynamics of British India between 1857 till 1947). • Contributions of founding fathers of Pakistan in the freedom movement including but not limited to Allama Muhammad Iqbal, Muhammad Ali Jinnah., etc. • Contributions of women and students in the freedom movement for separate homeland for Muslims of British India. 2. Two-Nation Theory: • Evolution of the 'Two-Nation Theory (Urdu-Hindi controversy, Partition of Bengal, Simla Deputation 1906, Allama Iqbal's Presidential Address 1930, Congress Ministries 1937 Lahore Resolution 1940). • Role of communalism and religious differences. 3. Introduction to the Constitution of Pakistan: • Definition and importance of a constitution. • Ideological factors that shaped the Constitution(s) of Pakistan (Objectives Resolution 1949). • Overview of constitutional developments in Pakistan. 4. Constitution and State Structure: • Structure of Government (executive, legislature, and judiciary). • Distribution of powers between federal and provincial governments. • 18th Amendment and its impact on federalism. 5. Fundamental Rights, Principles of Policy and Responsibilities: • Overview of fundamental rights guaranteed to citizens by the Constitution of Pakistan 1973 (Articles 8-28). • Overview of Principles of Policy (Articles 29-40). • Responsibilities of the Pakistani citizens (Article 5). 6. Constitutional Amendments: • Procedures for amending the Constitution. • Notable constitutional amendments and their implications.			
Recommended Books			
1. "The Idea of Pakistan" by Stephen P. Cohen. 2. "Ideology of Pakistan" by Javed Iqbal. 3. "The Struggle for Pakistan" by I.H. Qureshi. 4. "Pakistan the Formative Phase" by Khalid Bin Sayeed. 5. "Pakistan: Political Roots and Development" by Safdar Mahmood.			

(Course Code) and Title (EEH-121) Pakistan Studies		Credit Hours (2+0)	Pre-Requisite None	
Knowledge & Attitude Profile		Range of Problem Identification & Solving	Range of Engineering Activities	
SK1 (Natural and Social Sciences)		-	-	
Sustainable Development Goals (SDGs)		Professional Competence Profile		
-		TC-6 (Protection of society)		
Course Objectives				
This course is designed to provide students with a comprehensive exploration of Pakistan's identity, spanning geographical, historical, and cultural dimensions. It delves into the diverse landscapes, ancient civilizations, and rich cultural heritage that define Pakistan. Moreover, it examines the socio-cultural and political transformations in Pakistan over time including democratic transitions and military interventions. The aim of this course is to inculcate in students a nuanced understanding of Pakistan's past, present, and potential future trajectories, enabling them to critically evaluate the complex dynamics shaping the nation's development.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Enhance knowledge of the geographical, historical, and political aspects of Pakistan.		C-2	PLO-6/SA-6
CLO-2	Understand the society and culture of Pakistan.		C-2	PLO-6/SA-6
CLO-3	Understand and explain the socio-economic developments in Pakistan.		C-3	PLO-6/SA-6
CLO-4	Explore contemporary issues and challenges faced by Pakistan and their implications for the future.		C-4	PLO-6/SA-6
Course Outline for Theory				
1. Introduction to Pakistan: - Geographical location and significance. - Historical background: Ancient civilizations in the region. - Factors leading to the creation of Pakistan.				
2. Political History of Pakistan: - Formative phase. - Military interventions and democratic transitions.				
3. Geography of Pakistan: - Physiography: Mountains, plains, plateaus, deserts, valleys and coastal areas. - River systems: Indus River and its tributaries. - Climatic regions of Pakistan.				
4. Society and Culture of Pakistan: - Socio-cultural diversity. - Languages and literature of Pakistan.				
5. Economic Development of Pakistan: - Agriculture and industrial sectors of Pakistan. - Economic challenges of Pakistan.				
6. Contemporary Issues: Foreign relations of Pakistan.				

- Security challenges: terrorism, extremism, and regional conflicts.
- Environmental problems and sustainable development (SDGs).
- Media and social change.

Recommended Books

1. "Jinnah of Pakistan" by Stanley Wolpert.
2. "The Sole Spokesman: Jinnah, the Muslim League, and the Demand for Pakistan" by Ayesha Jalal.
3. "The struggle for Pakistan" by Ishtiaq Husain Qureshi.
4. "Pakistan, the Formative Phase, 1857-1948" by Khalid B. Sayeed.
5. "Pakistan Studies: A Book of Readings" by Sikandar Hayat.

(Course Code) and Title (EEN-111) Quantitative Reasoning–I		Credit Hours (3+0)	Pre-Requisite None	
Knowledge & Attitude Profile SK1 (Natural and Social Sciences) SK2 (Mathematics)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required)	Range of Engineering Activities TA-1(Range of resources)	
Sustainable Development Goals (SDGs) -		Professional Competence Profile TC-1 (Comprehend and apply universal knowledge)		
Course Objectives				
Quantitative Reasoning–I is an introductory-level undergraduate course that focuses on the fundamentals related to the quantitative concepts and analysis. The course is designed to familiarize students with the basic concepts of mathematics and statistics and to develop students' abilities to analyze and interpret quantitative information. Through a combination of theoretical concepts and practical exercises, this course will also enable students cultivate their quantitative literacy and problem-solving skills while effectively expanding their academic horizon and breadth of knowledge of their specific major / field of study.				
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain fundamental quantitative concepts including algebraic operations, functions, and basic statistical measures used in engineering technology applications.		C-2	PLO-1/SA-1
CLO-2	Apply mathematical techniques and logical reasoning to solve structured and real-world engineering technology problems.		C-3	PLO-2/SA-2
CLO-3	Analyze quantitative data and relationships to support informed decision-making while demonstrating accuracy and responsible use of data.		A-3	PLO-9/SA-9
Course Outline for Theory				
1. Numerical Literacy • Number system and basic arithmetic operations; • Units and their conversions, dimensions, area, perimeter and volume; • Rates, ratios, proportions and percentages; • Types and sources of data; • Measurement scales; • Tabular and graphical presentation of data; • Quantitative reasoning exercises using number knowledge				
2. Fundamental Mathematical Concepts • Basics of geometry (lines, angles, circles, polygons etc.); • Applications: slope, equation of tangent and normal. maxima, minima and point of inflection • Sets and their operations;				

- Relations, functions, and their graphs;
- Exponents, factoring and simplifying algebraic expressions;
- Algebraic and graphical solutions of linear and quadratic equations and inequalities;
- Quantitative reasoning exercises using fundamental mathematical concepts.

3. Fundamental Statistical Concepts

- Population and sample;
- Measures of central tendency, dispersion and data interpretation;
- Rules of counting (multiplicative, permutation and combination);
- Basic probability theory;
- Introduction to random variables and their probability distributions;
- Quantitative reasoning exercises using fundamental statistical concepts.

Recommended Books

1. "Quantitative Reasoning: Tools for Today's Informed Citizen" by Bernard L. Madison, Lynn and Arthur Steen.
2. "Quantitative Reasoning for the Information Age" by Bernard L. Madison and David M. Bressoud.
3. "Fundamentals of Mathematics" by Wade Ellis.
4. "Quantitative Reasoning: Thinking in Numbers" by Eric Zaslow.
5. "Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis" by Ethan Bueno de Mesquita and Anthony Fowler.

(Course Code) and Title (EEN-211) Quantitative Reasoning–II		Credit Hours (3+0)	Pre-Requisite None	
Knowledge & Attitude Profile SK1 (Natural and Social Sciences) SK2 (Mathematics)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required)	Range of Engineering Activities TA-1(Range of resources)	
Sustainable Development Goals (SDGs) -		Professional Competence Profile TC-2 (Comprehend and apply local knowledge)		
Course Objectives				
Quantitative Reasoning–II is a sequential undergraduate course that focuses on logical reasoning supported with mathematical and statistical concepts and modeling / analysis techniques to equip students with analytical skills and critical thinking abilities necessary to navigate the complexities of the modern world. The course is designed to familiarize students with the quantitative concepts and techniques required to interpret and analyze numerical data and to inculcate an ability in students the logical reasoning to construct and evaluate arguments, identify fallacies, and think systematically. Keeping the pre-requisite course of Quantitative Reasoning-I as its base, this course will enable students to further their quantitative, logical and critical reasoning abilities to complement their specific major / field of study.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Analyze technical propositions and arguments using formal logic, truth tables, and Venn diagrams to detect fallacies.		C-4	PLO-2/SA-1
CLO-2	Construct deterministic mathematical models, including linear and exponential functions, to solve engineering technology problems.		C-3	PLO-1/SA-2
CLO-3	Perform statistical inference and hypothesis testing on multiple datasets to support evidence-based decision making.		C-3	PLO-4/SA-4
Course Outline for Theory				

1. Logic, Logical and Critical Reasoning

- Introduction and importance of logic;
- Inductive, deductive and abductive approaches of reasoning;
- Propositions, arguments (valid; invalid), logical connectives, truth tables and propositional equivalences;
- Logical fallacies;
- Venn Diagrams;
- Predicates and quantifiers;
- Quantitative reasoning exercises using logical reasoning concepts and techniques.

2. Mathematical Modeling and Analyses

- Introduction to deterministic models;
- Use of linear functions for modeling in real-world situations;
- Modeling with the system of linear equations and their solutions;
- Elementary introduction to derivatives in mathematical modeling;
- Linear and exponential growth and decay models;
- Quantitative reasoning exercises using mathematical modeling.

3. Statistical Modeling and Analyses

- Introduction to probabilistic models;
- Bivariate analysis, scatter plots;
- Simple linear regression model and correlation analysis;
- Basics of estimation and confidence interval;
- Testing of hypothesis (z-test; t-test);
- Statistical inference in decision making;
- Quantitative reasoning exercises using statistical modeling.

Recommended Books

1. "Using and Understanding Mathematics: A Quantitative Reasoning Approach" by Bennett, J. O., Briggs, W. L., & Badalamenti, A.
2. "Discrete Mathematics and its Applications" by Kenneth H. Rosen.
3. "Discrete Mathematics with Applications" by Susanna S. Epp.
4. "Applied Mathematics for Business, Economics and Social Sciences" by Frank S Budnick.
5. "Elementary Statistics: A Step-by-Step Approach" by Allan Bluman.

(Course Code) and Title (EEH-112) Islamic Studies	Credit Hours (2+0)	Pre-Requisite None
Knowledge & Attitude Profile SK1 (Natural and Social Sciences) SK9 (Ethics)	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -		Professional Competence Profile TC-1 (Comprehend and apply universal knowledge) TC-8 (Ethics)
Course Objectives		
This course is designed to provide students with a comprehensive overview of the fundamental aspects of Islam, its beliefs, practices, history and influence on society. It will further familiarize the students with a solid foundation in understanding Islam from an academic and cultural perspective. Through this course, students will have an enhanced understanding of Islam's multifaceted dimensions which will enable them to navigate complex discussions about Islam's historical and contemporary role, fostering empathy, respect, and informed dialogue		



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Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain the fundamental principles of Islam and the historical contributions of Muslims to global civilization.	C-2	PLO-1/SA-1
CLO-2	Practice ethical and professional values derived from the Sirah of the Prophet (PBUH) in interpersonal interactions.	A-3	PLO-7/SA-7
CLO-3	Analyze modern socio-cultural and technological issues using the principles of Islamic jurisprudence (Ijtihad).	C-4	PLO-6/SA-6
Course Outline for Theory			
1. Introduction to Islam: Definition of Islam and its core beliefs. The Holy Quran (introduction, revelation and compilation). Hadith and Sunnah (compilation, classification, and significance). Key theological concepts and themes (Tawhid, Prophethood, Akhirah etc.). 2. Sirah of the Holy Prophet (Peace Be Upon Him) as Uswa-i-Hasana: Life and legacy of the Holy Prophet PBUH. Diverse roles of the Holy Prophet PBUH (as an individual, educator, peace maker, leader etc.). 3. Islamic History and Civilization: World before Islam. The Rashidun Caliphate and expansion of Islamic rule. Contribution of Muslim scientists and philosophers in shaping world civilization. 4. Islamic Jurisprudence (Fiqh): Fundamental sources of Islamic jurisprudence. Pillars of Islam and their significance. Major schools of Islamic jurisprudence. Significance and principles of Ijtihad. 5. Family and Society in Islam: Status and rights of women in Islamic teachings. Marriage, family, and gender roles in Muslim society. Family structure and values in Muslim society. 6. Islam and the Modern World: Relevance of Islam in the modern world (globalization, challenges and prospects). Islamophobia, interfaith dialogue, and multiculturalism. Islamic viewpoint towards socio-cultural and technological changes.			
Recommended Books			
"The Five Pillars of Islam: A Journey Through the Divine Acts of Worship" by Muhammad Mustafa Al-Azami. "The Five Pillars of Islam: A Framework for Islamic Values and Character Building" by Musharraf Hussain. "Towards Understanding Islam" by Abul A' la Mawdudi. "Islami Nazria e Hayat" by Khurshid Ahmad. "An Introduction to Islamic Theology" by John Renard.			

(Course Code) and Title (EEH-111) Functional English	Credit Hours (3+0)	Pre-Requisite None
Knowledge & Attitude Profile SK1 (Natural and Social Sciences)	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -	Professional Competence Profile TC-10 (Communication and Collaboration)	
Course Objectives		
This course is designed to equip students with essential language skills for effective communication in diverse real-world scenarios. It focuses on developing proficiency in English language usage: word choices, grammar and sentence structure. In addition, the course will enable students to grasp nuanced messages and tailor their communication effectively through application of comprehension and analytical skills in listening and reading. Moreover, the course encompasses a range of practical communication aspects including professional writing, public speaking, and everyday conversation, ensuring that students are equipped for both academic and professional spheres. An integral part of the course is fostering a deeper understanding of the impact of language on diverse audiences. Students will learn to communicate inclusively and display a strong commitment to cultural awareness in their language use. Additionally, the course will enable them to navigate the globalized world with ease and efficacy, making a positive impact on their functional interactions		

Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Apply English communication skills through effective use of word choices, grammar and sentence structure.	C-3	PLO9/SA-9
CLO-2	Comprehend a variety of written and spoken texts in English.	C-4	PLO-2/SA-2
CLO-3	Effectively express information, ideas and opinions in written and spoken English.	C-3	PLO-9/SA-9
CLO-4	Collaborate effectively in teams by applying appropriate verbal, non-verbal, and interpersonal communication skills.	A-2	PLO-8/SA-8

Course Outline for Theory

1. Foundations of Functional English:

- Vocabulary building (contextual usage, synonyms, antonyms and idiomatic expressions)
- Communicative grammar (subject-verb-agreement, verb tenses, fragments, run-ons, modifiers, articles, word classes, etc.)
- Word formation (affixation, compounding, clipping, back formation, etc.)
- Sentence structure (simple, compound, complex and compound-complex)
- Sound production and pronunciation

2. Comprehension and Analysis:

- Understanding purpose, audience and context
- Contextual interpretation (tones, biases, stereotypes, assumptions, inferences, etc.)
- Reading strategies (skimming, scanning, SQ4R, critical reading, etc.)
- Active listening (overcoming listening barriers, focused listening, etc.)

3. Effective Communication:

- Principles of communication (clarity, coherence, conciseness, courteousness, correctness, etc.)
- Structuring documents (introduction, body, conclusion and formatting)
- Inclusivity in communication (gender-neutral language, stereotypes, cross-cultural communication, etc.)
- Public speaking (overcoming stage fright, voice modulation and body language)
- Presentation skills (organization content, visual aids and engaging the audience)
- Informal communication (small talk, networking and conversational skills)
- Professional writing (business e-mails, memos, reports, formal letters, etc.)

Recommended Books

1. "Understanding and Using English Grammar" by Betty Schramper Azar.
2. "English Grammar in Use" by Raymond Murphy.
3. "The Blue Book of Grammar and Punctuation" by Jane Straus.
4. "English for Specific Purposes: A Learning-Centered Approach" by Tom Hutchinson and Alan Waters.
5. "Cambridge English for Job-hunting" by Colm Downes.

(Course Code) and Title (EEE-121) Expository Writing	Credit Hours (3+0)	Pre-Requisite None
Knowledge & Attitude Profile SK1 (Natural and Social Sciences)	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -	Professional Competence Profile TC-10 (Communication and Collaboration)	
Course Objectives		

Expository Writing is a sequential undergraduate course aimed at refining writing skills in various contexts. Building upon the foundation of the pre-requisite course, Functional English, this course will enhance students' abilities of producing clear, concise and coherent written texts in English. The course will also enable students to dissect intricate ideas, to amalgamate information and to express their views and opinions through well-organized essays. The students will further be able to refine their analytical skills to substantiate their viewpoints using credible sources while adhering to established ethical writing norms. Additionally, the course will highlight the significance of critical thinking enabling students to produce original and engaging written texts.

Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Apply the stages of the writing process to produce well-structured essays.	C-3	PLO-9/SA-9
CLO-2	Analyze and produce different types of expository writing for varied purposes and audiences.	C-4	PLO-4/SA-4
CLO-3	Demonstrate ethical writing practices by ensuring originality and proper attribution.	C-3	PLO-7/SA-7

Course Outline for Theory

1. Introduction to Expository Writing

- Understanding expository writing (definition, types, purpose and applications)
Characteristics of effective expository writing (clarity, coherence and organization)
- Introduction to paragraph writing

2. The Writing Process

- Pre-writing techniques (brainstorming, free-writing, mind-mapping, listing, questioning and outlining etc.)
- Drafting (three stage process of drafting techniques)
- Revising and editing (ensuring correct grammar, clarity, coherence, conciseness etc.)
- Proof reading (fine-tuning of the draft)
- Peer review and feedback (providing and receiving critique)

3. Essay Organization and Structure

- Introduction and hook (engaging readers and introducing the topic)
- Thesis statement (crafting a clear and focused central idea)
- Body Paragraphs (topic sentences, supporting evidence and transitional devices)
- Conclusion (types of concluding paragraphs and leaving an impact)
- Ensuring cohesion and coherence (creating seamless connections between paragraphs)

4. Different Types of Expository Writing

- Description
- Illustration
- Classification
- Cause and effect (exploring causal relationships and outcomes)
- Process analysis (explaining step-by-step procedures)
- Comparative analysis (analyzing similarities and differences)

5. Writing for Specific Purposes and Audiences

- Different types of purposes (to inform, to analyze, to persuade, to entertain etc.)
- Writing for academic audiences (formality, objectivity, and academic conventions)
- Writing for public audiences (engaging, informative and persuasive language)
- Different tones and styles for specific purposes and audiences

6. Ethical Considerations

- Ensuring original writing (finding credible sources, evaluating information etc.)
- Proper citation and referencing (APA, MLA, or other citation styles)

- Integrating quotes and evidences (quoting, paraphrasing, and summarizing)
- Avoiding plagiarism (ethical considerations and best practices)

Recommended Books

1. "The St. Martin's Guide to Writing" by Rise B. Axelrod and Charles R. Cooper.
2. "They Say / I Say: The Moves That Matter in Academic Writing" by Gerald Graff and Cathy Birkenstein.
3. "Writing Analytically" by David Rosenwasser and Jill Stephen.
4. "Style: Lessons in Clarity and Grace" by Joseph M. Williams and Joseph Bizup.
5. "The Elements of Style" by William Strunk Jr. and E.B. White.

(Course Code) and Title (EEH-113) Ethics	Credit Hours (2+0)	Pre-Requisite None		
Knowledge & Attitude Profile SK1 (Natural and Social Sciences)	Range of Problem Identification & Solving -	Range of Engineering Activities -		
Sustainable Development Goals (SDGs) -		Professional Competence Profile TC-10 (Communication and Collaboration)		
Course Objectives				
This course is designed to provide students with a fundamental exploration of ethics and its practical applications in diverse contexts. Students will get introduced to the genealogy of the subject and will be able to understand and analyze moral dilemmas and contemporary issues using ethical reasoning and decision-making skills. The course content has been designed to enable learners to examine their personal values, cultivate ethical qualities, and foster social responsibility in both personal and professional spheres.				
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain fundamental concepts, theories, and principles of ethics, including normative, applied, and professional ethics in contemporary contexts.		C-2	PLO-9/SA-9
CLO-2	Analyze ethical dilemmas and contemporary societal issues using appropriate ethical reasoning and decision-making frameworks.		C-4	PLO-7/SA-7
CLO-3	Demonstrate ethical behavior, social responsibility, and respect for diversity in personal, academic, and professional environments.		A-3	PLO-7/SA-7
Course Outline for Theory				

1. What is Ethics?

- Definitions and significance of ethics.
- Difference and inter-play between ethics, morality and virtue.

2. Types of Ethics

- Theoretical ethics
- Normative ethics
- Descriptive ethics
- Meta-ethics
- Applied ethics
- Business ethics
- Environmental ethics
- Biomedical ethics
- Media ethics
- Subject related ethics

3. Major Theories of Ethics - Ethical Decision Making (not limited to)

- Virtue ethics
- Egoism
- Utilitarianism
- Deontological ethics

4. Moral Sensitivity

- Ethics of difference and alterity
- Normative and informational biases
- Decision heuristics (stereotypical imaging etc.) Ethical dilemmas

5. Applied Ethics (not limited to)

- Ethics and media and new media
- Ethics and artificial intelligence
- Ethics and the environment

Recommended Books

1. "The Fundamentals of Ethics" by Russ Shafer-Landau.
2. "Ethics: History, Theory, and Contemporary Issues" by Steven M. Cahn and Peter Markie.
3. "Islamic Ethics: An Introduction" by Jonathan A.C. Brown.
4. "Applied Ethics: A Multicultural Approach" by Larry May and Shari CollinsChobanian.
5. "Environmental Ethics: An Introduction to Environmental Philosophy" by Joseph R. DesJardins and Ronald P. Sikora.

(Course Code) and Title (EEH-122) Fehm e Quran – I		Credit Hours 0+1	Pre-Requisite None
Knowledge & Attitude Profile SK-1		Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -		Professional Competence Profile TC-1 (Comprehend and apply universal knowledge)	
Course Objectives			
To develop a foundational understanding of Quranic Arabic for partial comprehension of the Holy Quran.			
Course Learning Outcomes	CLOs Statement After completion of this course students will be able to:	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Discuss and explain the meanings of the words of Quran, its phrases and sentences.	C-2	PLO-11/SA-11
Course Outline for Theory			

This course is designed to build a foundational understanding of Quranic Arabic by focusing on basic vocabulary, phrases, and sentence structures derived from the Muallim-ul-Quran book. It enables students to comprehend simple Quranic words and sentences without verbs, and gradually introduces present tense sentence structures. The course emphasizes understanding key linguistic components such as particles (operative and non-operative), pronouns, adjective and possessive compounds, and different types of plurals through Quranic examples. Students will also learn to recognize various styles of Quranic sentences, including nominal, emphatic, negative, interrogative, and oath-based structures. Furthermore, the course strengthens students' familiarity with Quranic expressions, idioms, and linguistic patterns, ultimately enabling them to understand approximately 30–40% of each page of the Holy Quran with clarity and confidence

Recommended Books

1. Muallim ul Quran (volume 1, 2, and 3) by Dr. Ubaid ur Rehman

(Course Code) and Title (EEH-212) Fehm e Quran – II	Credit Hours 0+1	Pre-Requisite Fehm e Quran – I
Knowledge & Attitude Profile SK-1	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -	Professional Competence Profile TC-1 (Comprehend and apply universal knowledge)	

Course Objectives

To develop students' ability to understand and interpret the Holy Quran through proficiency in Quranic Arabic.

Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain the meanings of selected Quranic verses by applying fundamental Arabic grammatical structures, including present tense, past tense, imperative forms, passive voice, and conditional expressions.	C-2	PLO-11/SA-11
CLO-2	Interpret the meanings and messages of selected Quranic verses by understanding common Quranic vocabulary, sentence structures, and their contextual significance.	C-2	PLO-11/SA-11

Course Outline for Theory

Fehm-e-Quran-II is a mandatory, one-credit hour practical course designed by the HEC to enable students to directly comprehend the Holy Quran through its original Arabic language. Building upon the foundations of Part I, this advanced module focuses on complex grammatical structures, including past and present verb forms, conditional particles, and active participles. Students engage in intensive translation exercises and thematic analysis to bridge the gap between linguistic theory and spiritual application. By the end of the semester, learners are expected to understand approximately 80% of Quranic text independently without relying on external translations. The curriculum utilizes Muallim-ul-Quran as its primary textbook to ensure a structured and standardized learning experience across all degree programs. This course ultimately aims to foster a profound, personal connection with the divine message while fulfilling core academic requirements for undergraduate and graduate studies.

Recommended Books

1. Muallim ul Quran (volume 3, 4, and 5) by Dr. Ubaid ur Rehman.

(Course Code) and Title (EEH-122) Fehm e Quran – I	Credit Hours 0+1	Pre-Requisite None
Knowledge & Attitude Profile SK-1	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -	Professional Competence Profile	



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		TC-1 (Comprehend and apply universal knowledge)	
Course Objectives			
To develop a foundational understanding of Quranic Arabic for partial comprehension of the Holy Quran.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:		
CLO-1	Discuss and explain the meanings of the words of Quran, its phrases and sentences.	C-2	PLO-11/SA-11
Course Outline for Theory			
This course is designed to build a foundational understanding of Quranic Arabic by focusing on basic vocabulary, phrases, and sentence structures derived from the Muallim-ul-Quran book. It enables students to comprehend simple Quranic words and sentences without verbs, and gradually introduces present tense sentence structures. The course emphasizes understanding key linguistic components such as particles (operative and non-operative), pronouns, adjective and possessive compounds, and different types of plurals through Quranic examples. Students will also learn to recognize various styles of Quranic sentences, including nominal, emphatic, negative, interrogative, and oath-based structures. Furthermore, the course strengthens students' familiarity with Quranic expressions, idioms, and linguistic patterns, ultimately enabling them to understand approximately 30–40% of each page of the Holy Quran with clarity and confidence			
Recommended Books			
2. Muallim ul Quran (volume 1, 2, and 3) by Dr. Ubaid ur Rehman			

(Course Code) and Title (EEH-XXX) Introduction to Foreign Language and Culture	Credit Hours 2+0	Pre-Requisite -
Knowledge & Attitude Profile -	Range of Problem Identification & Solving -	Range of Engineering Activities -
Sustainable Development Goals (SDGs) -	Professional Competence Profile -	
Course Objectives		
This course is intended to provide students with introductory communicative competence in a selected foreign language and an understanding of its associated culture. The course should focus on practical language use and intercultural awareness rather than advanced grammatical proficiency. By the end of the 16-week course, students are expected to demonstrate the ability to communicate at a basic level in familiar situations, understand simple spoken and written language, produce basic written expressions, and demonstrate an informed understanding of relevant cultural practices and contexts. The course objectives may include the following: 1. Recognize and use basic sounds, pronunciation features, and the writing system of the selected foreign language. 2. Read and write basic words, expressions, and sentences using the appropriate writing system of the foreign language. 3. Apply basic language and cultural knowledge in simple communicative situations, including everyday conversations and familiar social contexts. Higher Education Institutions (HEIs) may select an appropriate foreign language based on the needs and interests of relevant stakeholders and the institutional context. The selected language should be supported by appropriate course learning outcomes, content, teaching and learning strategies, and assessment methods. These should be developed in accordance with the relevant course template (as per other courses in the curriculum) and the guidelines provided in the IEA Graduate Attributes and Professional Competencies document.		

7.2. Engineering Technology Foundation Course Contents

(Course Code) and Title (EET-112) Workshop Practice		Credit Hours 0+1	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP6 (Involve Different Engineering Disciplines)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4 and SDG-8		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis)	
Course Objectives			
By the end of this course, students will gain basic workshop skills, understand electrical safety, use common tools and accessories, and perform simple wiring, measurements, soldering, PCB design, fabrication, and testing.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Demonstrate the safe handling and use of basic workshops and electrical tools for carrying out fundamental practical operations.	P-3	PLO-5 / SA-5
CLO-2	Perform basic electrical wiring tasks by applying standard wiring regulations, circuit practices, and testing methods.	P-3	PLO-1 / SA-1
CLO-3	Construct and test a basic electronic circuit board using standard PCB fabrication, soldering, and verification techniques.	P-4	PLO-3 / SA-3
CLO-4	Prepare and present laboratory work using proper diagrams, observations, measurements, safety notes, and conclusions.	A-2	PLO-9/ SA-9
Course Outline for Theory			
• Use of carpenter’s tools and practice in preparing simple joints. • Bench fitting practice, including marking and fitting exercises. • Smithy work, including use of forge, bending, upsetting, and swaging. • Introduction to workshop facilities, including mechanical and electrical equipment. • Electrical safety practices, including safety regulations, earthing, electric shocks, and treatment methods. • Use of electrician’s tools, wiring regulations, cables, accessories, protection devices, and electrical wiring symbols. • Drawing, practice, and testing simple house wiring, including two-way, three-way, and ringing circuits. • Voltage and current measurement using basic electrical instruments. • Electric soldering, soldering tools, methods, and practical soldering skills. • PCB designing, circuit transfer, etching, drilling, component soldering, and PCB testing.			
Recommended Books			
1. "Elements of Workshop Technology” by S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, 17th Edition, 2023. 2. "Workshop Processes, Practices and Materials" by Bruce J. Black, 5th Edition, 2015. 3. "Introduction to Basic Manufacturing Process and Workshop Technology" by Rajender Singh, 2nd Edition, 2010. 4. "Basic Electrical Installation Work" by Trevor Linsley, 9th Edition, 2019. 5. "Printed Circuit Boards: Design, Fabrication, Assembly and Testing" by R. S. Khandpur, 1st Edition, 2006.			
(Course Code) and Title (EET-111) Linear Circuit Analysis		Credit Hours (2+1)	Pre-Requisite None



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Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources)	
Sustainable Development Goals (SDGs) SDG-9			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis), TC-5 (Evaluation) TC-10 (Communication & Collaboration)		
Course Objectives					
After completion of this course students will be able to understand and analyze the electrical quantities, components, theorems and problem-solving techniques in DC circuits and validation of concepts in lab work with the interpretation of results.					
Course Learning Outcomes	CLOs Statement			Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the fundamental concepts, components, laws, and principles of linear electric circuits.			P-3	PLO-5 / SA-5
CLO-2	Apply circuit laws, network theorems, and circuit-solving techniques to solve linear electric circuits.			P-3	PLO-1 / SA-1
CLO-3	Conduct laboratory experiments, record measurements, compare theoretical and practical results, and interpret deviations.			P-4	PLO-3 / SA-3
CLO-4	Prepare and present laboratory reports using circuit diagrams, measured data, calculations, results, and conclusions.			A-2	PLO-9/ SA-9
Course Outline for Theory					
• Basic circuit concepts and elements: Charge, current, voltage, power, energy, passive sign convention, lumped circuit model, resistors, capacitors, inductors, independent/dependent sources, and ideal/practical source models. • Fundamental circuit laws and simple circuits: Ohm’s law, Kirchhoff’s Current Law, Kirchhoff’s Voltage Law, series-parallel circuits, voltage division, current division, and equivalent resistance. • Circuit analysis techniques: Source transformation, nodal analysis, mesh analysis, super nodes, super meshes, and analysis of DC resistive networks. • Network theorems and applications: Linearity, proportionality, additivity, superposition theorem, Thevenin and Norton theorems, source equivalence, load analysis, and maximum power transfer. • Capacitors, inductors, and first-order circuits: V-I relationships, stored energy, continuity conditions, initial/final values, natural response, forced response, complete response, time constant, charging and discharging behavior of RC and RL circuits.					
Lab Work Outline for Practical					
• Use of basic laboratory instruments, including DC power supply, digital multimeter, function generator, and oscilloscope. • Verification of basic circuit laws and concepts, including Ohm’s law, resistor power dissipation, KCL, KVL, voltage divider, and current divider circuits. • Practical analysis of resistive networks using series-parallel circuits, nodal analysis, mesh analysis, and superposition theorem. • Verification of network theorems and transient responses, including Thevenin and Norton equivalents, maximum power transfer, RC charging/discharging, and RL transient response.					
Recommended Books					
1. "Fundamentals of Electric Circuits" by Charles Alexander and M Sadiku, Latest Edition, McGraw- Hill. 2. "Electric Circuits Fundamentals", by S. Franco, Latest Edition, Oxford University Press.					

3. "Basic Engineering Circuit Analysis" by J. D. Irwin and R M Nelms, Latest Edition, John Wiley.
4. "The Analysis & Design of Linear Circuits" by R.E. Thomas, Rosa and G. Toussaint, Latest Edition, John Wiley.
5. "Engineering Circuit Analysis" by W. Hayt, J. Kemmerly and S. Durbin, Latest Edition, McGraw- Hill.

(Course Code) and Title (EET-122) Digital Electronics		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4 and SDG-9			Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis)	
Course Objectives				
By the end of this course, students will be able to understand digital logic fundamentals, design combinational and sequential circuits, and verify, simulate, and troubleshoot digital systems using hardware experiments and/or HDL simulation.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Analyze and simplify digital logic problems using Boolean algebra, Karnaugh maps (K-maps), and other logic simplification techniques, and verify the resulting logic functions using truth tables.		C-4	PLO2 / SA2
CLO-2	Apply digital logic design techniques to implement combinational and sequential circuits according to given requirements.		C-3	PLO3 / SA3
CLO-3	Construct , test, and troubleshoot digital logic circuits using hardware components and simulation tools.		P-4	PLO5 / SA5
CLO-4	Present and discuss the experiments performed in the laboratory by interpreting experimental data and results obtained from digital circuits		A-2	PLO-9/ SA-9
Course Outline for Theory				
• Introduction to Digital Electronics: Analog and digital signals; digital abstraction; logic levels; binary logic; advantages of digital systems; applications in computers, communication systems, automation, instrumentation, embedded systems and consumer electronics. • Number Systems and Codes: Decimal, binary, octal and hexadecimal number systems; radix conversion; signed and unsigned numbers; 1's and 2's complement; binary arithmetic; BCD code; Gray code; ASCII code; error-detecting codes; parity bit. • Logic Gates and Boolean Algebra: Basic logic gates: AND, OR, NOT; universal gates: NAND and NOR; exclusive gates: XOR and XNOR; Boolean variables and expressions; Boolean laws and theorems; De Morgan's theorems; standard and canonical forms. • Logic Simplification Techniques: Sum-of-products and product-of-sums forms; min-terms and maxterms; Karnaugh maps for 2, 3, 4 and 5 variables; don't-care conditions; practical minimization of logic circuits. • Combinational Logic Design: Design procedure for combinational circuits; implementation using basic gates and universal gates; timing behavior; propagation delay; hazards and glitches; practical design considerations. • Combinational Circuits: Adders: half adder, full adder, ripple-carry adder; subtractors; comparators; multiplexers; demultiplexers; encoders; decoders; code converters; parity generator and checker. • Sequential Logic Fundamentals: Difference between combinational and sequential circuits; memory elements; latches; SR latch; D latch; clocked circuits; edge triggering; timing concepts. • Flip-Flops: SR, JK, D and T flip-flops; truth tables; characteristic tables; excitation tables; characteristic equations; timing diagrams; applications of flip-flops.				

- **Registers and Shift Registers:** Basic registers; serial-in serial-out, serial-in parallel-out, parallel-in serial-out and parallel-in parallel-out shift registers; bidirectional shift registers; universal shift registers; practical applications.
- **Counters:** Asynchronous counters; synchronous counters; up counters; down counters; up/down counters; mod-N counters; decade counters; ring counters; Johnson counters; timing and decoding issues.
- **Sequential Circuit Analysis:** State equations; state tables; state diagrams; Mealy and Moore machines; state reduction; state assignment; design of simple finite-state machines.

Lab Work Outline for Practical

- Introduction to digital laboratory equipment and safety, including the use of breadboard, DC power supply, digital multimeter, logic probe, function generator, oscilloscope, and logic analyzer.
- Verification and implementation of basic logic circuits, including AND, OR, NOT, NAND, NOR, XOR, XNOR gates, universal gate implementation using NAND/NOR gates, Boolean expression implementation, simplification, and K-map based minimized circuits.
- Design and testing of combinational logic circuits, including half/full adders, half/full subtractors, multiplexers, demultiplexers, encoders, decoders, seven-segment display interfacing, comparators, and code converters.
- Verification and implementation of sequential logic circuits, including SR, JK, D and T flip-flops, registers, shift registers, ripple counters, synchronous counters, decade counters, and up/down counters using ICs or HDL simulation.

Recommended Books

1. "Digital Fundamentals" by Thomas E. Floyd, Latest Edition.
2. "Digital Systems: Principles and Applications" by Tocci and Widmer, Latest Edition.

(Course Code) and Title (EET-211) Electrical Network Analysis		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-9		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis)	
Course Objectives			
By the end of this course, students will be able to analyze AC electrical networks under sinusoidal steady-state and transient conditions, evaluate power, resonance, frequency response, and coupled circuits, and validate results through laboratory measurement and simulation.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Apply AC circuit analysis methods and concepts to solve electrical network problems under sinusoidal steady-state conditions.	C-3	PLO-1 / SA-1
CLO-2	Analyze transient responses of electrical circuits using appropriate time-domain and s-domain techniques.	C-4	PLO-2 / SA-2
CLO-3	Perform laboratory experiments related to electrical circuits using appropriate instruments, procedures, and measurement techniques.	P-3	PLO-4 / SA-4
CLO-4	Prepare and present AC network laboratory reports using phasor diagrams, measured waveforms, calculations, simulation results, and conclusions.	A-2	PLO-9/ SA-9
Course Outline for Theory			

- **Review of Linear Circuit Analysis Concepts:** Brief review of KCL, KVL, nodal analysis, mesh analysis, source transformation, Thevenin/Norton equivalents and first-order response.
- **Sinusoidal Steady-State Analysis:** Phasor representation, impedance, admittance, complex frequency concept, AC nodal analysis and AC mesh analysis.
- **AC Power Analysis:** Instantaneous power, average power, reactive power, apparent power, complex power, power factor and power-factor correction.
- **Resonance in AC Circuits:** Series resonance, parallel resonance, resonant frequency, bandwidth, half-power frequencies and quality factor.
- **Frequency Response of Networks:** Magnitude response, phase response, transfer function, Bode plots, low-pass, high-pass, band-pass and band-stop behavior.
- **Passive Filters:** RC and RL filters, RLC filters, first-order and second-order filter response, cutoff frequency and bandwidth.
- **Magnetically Coupled Circuits:** Mutual inductance, coefficient of coupling, dot convention, energy in coupled coils, linear transformers and ideal transformer concepts.
- **Laplace Transform for Circuit Analysis:** Laplace transform, inverse Laplace transform, initial conditions, s-domain models of R, L and C elements.
- **S-Domain Circuit Analysis:** Circuit transformation into s-domain, impedance and admittance in s-domain, analysis of RC, RL and RLC circuits using Laplace transform.

Lab Work Outline for Practical

- AC measurements using function generator and oscilloscope, including RMS value, peak value, frequency, and phase difference.
- Phasor-domain analysis and measurement of RC, RL, and RLC circuits, including impedance and admittance of R, L, and C elements.
- Verification of AC nodal and mesh analysis using practical circuit measurements.
- Measurement of AC power quantities, including real power, reactive power, apparent power, power factor, and power-factor correction using capacitor banks.
- Series and parallel RLC resonance experiments, including resonant frequency and circuit response.
- Frequency response analysis of passive filters, including RC low-pass/high-pass and RLC band-pass/band-stop filters.
- Magnetically coupled circuits and transformer experiments, including coupled coils and transformer behavior.
- Laplace/s-domain circuit simulation using SPICE or MATLAB.

Recommended Books

1. "Fundamentals of Electric Circuits" by Charles Alexander and M. Sadiku, Latest Edition, McGraw- Hill.
2. "Engineering Circuit Analysis" by W. Hayt, J. Kemberly and S. Durbin, Latest Edition, McGraw- Hill.
3. "Basic Engineering Circuit Analysis" by J. D. Irwin and R. M. Nelms, Latest Edition, Wiley.

(Course Code) and Title (EET-123) Electronic Devices and Circuits	Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)	Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4, SDG-7, SDG-9, SDG-12		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis)
Course Objectives		
By the end of this course, students will be able to understand semiconductor devices, analyze and design basic electronic circuits using diodes, BJTs and FETs, and verify their performance through laboratory measurements, simulation tools, and technical reporting.		

Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:		
CLO-1	Explain the structure, characteristics, and operation of semiconductor devices.	C-2	PLO-1 / SA-1
CLO-2	Analyze semiconductor-device-based circuits to implement practical solutions.	C-4	PLO-2 / SA-2
CLO-3	Construct and test basic electronic circuits for rectification, regulation, clipping, clamping, and biasing applications.	P-4	PLO-4/ SA-4
CLO-4	Prepare and present technical reports using measured characteristics, waveforms, simulation results, and circuit-performance interpretation. .	A-2	PLO-9/ SA-9
Course Outline for Theory			
• Introduction to Semiconductor Devices: Semiconductor materials; intrinsic and extrinsic semiconductors; electrons and holes; doping; N-type and P-type materials; drift and diffusion currents; carrier concentration; basic semiconductor conduction mechanism. • PN Junction Diode: Formation of PN junction; depletion region; barrier potential; forward and reverse biasing; V-I characteristics; diode resistance; temperature effects; ideal and practical diode models. • Diode Circuits and Applications: Half-wave and full-wave rectifiers; bridge rectifier; capacitor filter; ripple factor; clipping circuits; clamping circuits; voltage multiplier circuits; diode switching applications. • Special-Purpose Diodes: Zener diode and voltage regulation; LED; photodiode; Schottky diode; varactor diode; tunnel diode; basic optoelectronic applications. • Bipolar Junction Transistor: NPN and PNP transistor structure; transistor action; CB, CE and CC configurations; input and output characteristics; current gain; transistor regions of operation: cutoff, active and saturation. • BJT Biasing Circuits: Need for biasing; DC load line; operating point; fixed bias, collector-to-base bias, voltage-divider bias and emitter bias; bias stability; thermal runaway and stabilization. • BJT Small-Signal Amplifiers: Small-signal model of BJT; common-emitter amplifier; common-collector amplifier; common-base amplifier; voltage gain, current gain, input resistance and output resistance; coupling and bypass capacitors. • Field-Effect Transistors: JFET structure and operation; JFET characteristics; MOSFET structure; enhancement and depletion MOSFETs; NMOS and PMOS devices; MOSFET operating regions; comparison of BJT and FET. • FET and MOSFET Biasing: Self-bias, voltage-divider bias and current-source bias; MOSFET DC load line; biasing for amplifier and switching applications. • FET / MOSFET Small-Signal Amplifiers: Common-source amplifier; common-drain amplifier/source follower; common-gate amplifier; voltage gain; input and output resistance; practical amplifier applications.			
Lab Work Outline for Practical			
• Introduction to electronics laboratory equipment and safety, including component identification, breadboard practice, and use of DC power supply, function generator, digital multimeter, and oscilloscope. • Diode and rectifier circuit experiments, including PN junction diode V-I characteristics, cut-in voltage, dynamic resistance, half-wave/full-wave/bridge rectifiers with and without filters, clipper and clamper circuits, and Zener diode voltage regulation with line and load regulation. • Optoelectronic and special-purpose device experiments, including LED characteristics, photodiode behavior, and simple light-sensing or indicator circuits. • BJT circuit experiments, including common-emitter input/output characteristics, cutoff/active/saturation regions, fixed-bias and voltage-divider biasing, Q-point analysis, common-emitter amplifier, and common-collector/emitter-follower circuit performance. • FET/MOSFET circuits and simulation, including JFET/MOSFET characteristics, threshold or pinch-off voltage, MOSFET switching circuits, common-source amplifier gain and frequency response, and SPICE simulation of diode rectifiers, BJT biasing, transistor amplifiers, MOSFET switches, and op-amp circuits.			

Recommended Books	
1. "Electronic Devices" by Thomas E. Floyd, Latest Edition, Pearson.	
2. "Electronic Devices and Circuits" by Theodore F. Bogart Jr., Jeffrey S. Beasley, and Guillermo Rico, 6th Edition, Pearson, 2004.	

(Course Code) and Title (EET-212) Signals and Systems	Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)	Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis)

Course Objectives			
By the end of this course, students will be able to understand the fundamental concepts of continuous-time and discrete-time signals and systems, analyze LTI systems using time-domain and transform-domain techniques, and simulate and interpret signal and system responses using computational tools.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the fundamental principles, characteristics, and classifications of signals and systems.	C-2	PLO-1 / SA-1
CLO-2	Analyze signals and systems using appropriate time-domain and transform-domain techniques.	C-4	PLO-2 / SA-2
CLO-3	Simulate and interpret signal operations, sampling, convolution, system response, and stability using computational tools.	P-4	PLO-5/ SA-5
CLO-4	Prepare and present simulation-based results using plots, observations, and engineering interpretation.	A-2	PLO-9/ SA-9

Course Outline for Theory	
• Introduction to Signals and Systems: Continuous-time and discrete-time signals; analog and digital signals; deterministic and random signals; energy and power signals; examples from electronics, communication, control, instrumentation and signal processing. • Elementary Signals and Signal Operations: Unit impulse, unit step, ramp, exponential, sinusoidal and complex exponential signals; signal addition, multiplication, amplitude scaling, time shifting, time reversal and time scaling. • Classification of Signals: Periodic and aperiodic signals; even and odd signals; causal and non-causal signals; energy and power signals; continuous-time versus discrete-time representation. • Classification and Properties of Systems: Continuous-time and discrete-time systems; linear and nonlinear systems; time-invariant and time-varying systems; causal and non-causal systems; memory and memoryless systems; stable and unstable systems. • Linear Time-Invariant Systems: Impulse response; step response; convolution integral; convolution sum; graphical and analytical interpretation of convolution; response of LTI systems to standard input signals. • Differential and Difference Equation Models: Representation of continuous-time systems using differential equations; representation of discrete-time systems using difference equations; basic solution and interpretation of system response. • Fourier Series: Representation of periodic signals using Fourier Series; trigonometric and exponential Fourier Series; harmonic spectrum; amplitude and phase spectrum; practical interpretation of frequency components.	

- **Fourier Transform:** Continuous-Time Fourier Transform; Discrete-Time Fourier Transform; magnitude and phase spectra; basic Fourier Transform properties; relationship between time-domain and frequency-domain representation.
- **Sampling and Reconstruction:** Sampling theorem; Nyquist rate; aliasing; signal reconstruction; practical concept of analog-to-digital and digital-to-analog conversion; basic quantization concept.
- **Laplace Transform:** Laplace Transform of continuous-time signals; region of convergence; poles and zeros; transfer function; stability analysis of continuous-time systems.

Lab Work Outline for Practical

- **Generation, operations, and classification of signals**, including impulse, step, ramp, exponential, sinusoidal, rectangular, and triangular signals; amplitude scaling, time shifting, time reversal, time scaling, addition, multiplication, periodicity, even/odd nature, causality, energy, and power.
- **Sampling, quantization, reconstruction, and aliasing analysis**, including sampling of sinusoidal signals at different frequencies, Nyquist sampling condition, under-sampling, aliasing, basic quantization, signal reconstruction, and reconstruction errors.
- **Analysis of systems and LTI system response**, including verification of linearity, time invariance, causality, memory, and stability; linear and circular convolution; impulse response, step response, and output response using convolution.
- **Simulation and transform-domain analysis of signals and systems**, including differential and difference equation-based systems, Fourier Series approximation, FFT-based magnitude and phase spectrum analysis, Laplace transform, transfer function, pole-zero plot, and stability analysis.

Recommended Books

1. "Signals and Systems" by A. Oppenheim, A. Willsky and H. Nawab, Latest Edition, Pearson.
2. "Signals and Systems" by Simon Haykin and Barry Van Veen, Latest Edition, Wiley.

7.3. Engineering Technology Breadth Course Contents

(Course Code) and Title (EET-224) Microprocessors and Microcontrollers		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4, SDG-9			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis), TC-10 (Communication & Collaboration)	
Course Objectives				
Understand architecture and operation of microprocessors & microcontrollers. To develop assembly and embedded C programs. Interface microcontrollers with peripherals (I/O, ADC, DAC, sensors). Use modern development tools for embedded systems.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Explain the architecture, instruction set, memory organization, and operational features of Intel family microprocessors and PIC/8051 microcontrollers.		C-2	PLO-1 / SA-1
CLO-2	Apply assembly language programming techniques to solve the interfacing and data processing problems using microprocessors and microcontrollers.		C-3	PLO-2 / SA-2
CLO-3	Practice and program microcontroller-based circuits.		P-3	PLO-3 / SA-3
CLO-4	Design, program, and test microprocessor/microcontroller-based systems using development tools, simulators, and interfacing hardware for real-time applications.		P-4	PLO-5/ SA-5
CLO-5	Demonstrate professional ethics, teamwork, and effective technical communication while developing and troubleshooting embedded system applications.		A-3	PLO-10/ SA-10
Course Outline for Theory				
• Introduction to Intel family microprocessors, instruction set architecture (ISA). • Assembly Language Programming, hardware model, read/write cycles, exception/interrupt processing, I/O devices, DMA, interfacing to memory and I/O devices. • Microcontroller PIC/Atmel 8051/etc. • Introduction to microcontrollers; architecture and programming, Arithmetic Instructions, Logic Instructions, Program Control Instructions, Introduction to Interrupts.				
Lab Work Outline for Practical				
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments. • Introduction to development kit of any microcontroller • Development of different applications on microcontroller kit. • Learn to read datasheets/manuals in order to develop practical applications. • Assembly and C language-based microcontroller (PIC or Raspberry Pi) • Interfacing for interrupt and data-based applications involving LED/ LCD, GPIO ports, communication ports, A/D, and D/A interfacing.				

- Project can be input voltage-based speed control of DC Motor / stepper motor using PWM.

Recommended Books

1. "Designing Embedded Systems with PIC Microcontrollers: Principles and Applications" by T. Wilmshurst, 2nd ed. Oxford, U.K.: Newnes (Elsevier), 2010.
2. "Microprocessor and Interfacing" by Douglas V. Hall, Latest Edition, Tata McGraw-Hill.
3. "Electronic devices and circuits" by T. F. Bogart, Latest Edition, Prentice Hall International Inc.

(Course Code) and Title (EET-223) Amplifiers and Oscillators		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK4 (Specialist Knowledge)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4, SDG-9			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge) TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis) TC-5 (Evaluation) TC-10 (Communication & Collaboration)	
Course Objectives				
Understand principles of amplifiers and oscillators. Implement oscillator circuits and evaluate stability. Use modern tools for simulation and testing.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the operation and applications of various classes of amplifiers, multistage amplifiers, power amplifiers, and oscillators		C-2	PLO-1 / SA-1
CLO-2	Analyze the various amplifiers circuits to determine voltage/current gains, input/output impedance, efficiency/losses, loading effects.		C-4	PLO-2 / SA-2
CLO-3	Design the typical multistage amplifiers and oscillators.		C-6	PLO-3 / SA-3
CLO-4	Design, simulate, and test amplifier and oscillator circuits using modern electronic tools and laboratory equipment to achieve specified performance requirements.		P-4	PLO-5/ SA-5
CLO-5	Demonstrate professional ethics, teamwork, and effective communication while conducting laboratory experiments and interpreting electronic circuit behavior.		A-3	PLO-10/ SA-10
Course Outline for Theory				
• Classification of Amplifiers based on Biasing, • Class A Amplifier, Class B Amplifier, Class AB Amplifier, Class C Amplifier. Push-Pull Amplifier, and Complementary Symmetry Amplifier; Classification of Amplifiers Voltage. • Feedback Amplifier, Current Feedback Amplifier, Effect of Feedback on Frequency Response. • Practical Amplifier Considerations: Input and Output Impedance, Amplifier Loading, Impedance Matching. • Oscillators: Basic Theory, Tank Circuit, Damped and Un-damped Oscillations.				
Lab Work Outline for Practical				
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments.				
• Introduction to development of all types of Amplifiers. • Implementation of amplifiers to different applications. • Introduction to development of all types of Oscillators.				

- Implementation of Oscillators to different applications.

Recommended Books

1. "Electronics Fundamentals: Circuits, Devices, and Applications" by Thomas Floyd, Prentice Hall, 8th Edition.
2. "Electronic Circuits Analysis and Design" by Donald A. Neaman, 3rd Edition.
3. "Electronic devices and circuits" by T.F. Bogart, Latest Edition, Prentice Hall International Inc.

(Course Code) and Title (EET-221) Electrical Machines		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-7, SDG-8, SDG-9		Professional Competence Profile TC-1 (Comprehend & apply universal knowledge) TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis) TC-5 (Evaluation) TC-10 (Communication & Collaboration)	
Course Objectives			
Understand principles of electromechanical energy conversion. Design basic machine-related systems and select appropriate machines. Solve practical industrial problems involving electrical machines.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the principles of magnetic circuits, and the structural design/working mechanisms of electrical transformers and rotating machines.	C-2	PLO-1 / SA-1
CLO-2	Evaluate electrical machine performance data by executing standardized open-circuit, short-circuit, and load tests to determine core/copper losses.	C-5	PLO-4 / SA-4
CLO-3	Analyze the steady-state performance parameters such as efficiency, voltage regulation, and torque-speed characteristics of DC and AC machines.	C-4	PLO-2 / SA-2
CLO-4	Conduct laboratory experiments safely on transformers, DC motors, synchronous generators, and induction motors.	P-3	PLO-5/ SA-5
CLO-5	Work effectively as an individual or in group for performing different laboratory experiment.	A-3	PLO-9/ SA-9
CLO-6	Construct wiring circuits for various electrical machine configurations (such as transformer banks, DC shunt/series motors, and 3-phase induction motors) according to standard schematic diagrams.	P-4	PLO-4 / SA-4
Course Outline for Theory			
• Magnetic Circuits and Calculations. Linear DC machines. • Transformers: Principle of Operation, Construction, Types, Instrumentation Transformers. • DC Machines: Construction, Types, Armature Reaction, Torque Speed Characteristics, Measurement of Losses and Efficiency. • AC Machines: AC Machine Armature Winding, Induced EMF. Synchronous Generator. • Special Purpose Motors, Introduction to Brushless DC Motor, Switched-Reluctance Motor, Stepper Motor, etc.			
Lab Work Outline for Practical			
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments.			

- Safety precaution in performance and operation of experiments
- To identify and study main parts of a DC machine
- Different Types of Connections in Dc Generators
- O.C.C of Separately Excited Dc Generator
- External characteristics of Separately Excited Dc Generator
- Characteristics of DC shunt motor
- Plotting Graph of Torque Speed Curve of a Shunt DC motor using MATLAB
- Plotting Graph of Speed(n) Vs Field Resistance (RF) of a Shunt DC Motor
- Plotting Graph of Torque Speed Curve of a Shunt DC motor using MATLAB.

Recommended Books

1. "Electric Machinery Fundamentals" by Stephen J. Chapman, Latest Edition, McGraw-Hill.
2. "Electric Machinery" by Fitzgerald, Kingsley, and Umans, Latest Edition, McGraw-Hill.
3. "Electric Motor Maintenance and Troubleshooting" by Augie Hand, Latest Edition, McGraw-Hill.

(Course Code) and Title (EET-225) Control Systems		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK4 (Specialist Knowledge)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-9, SDG-11, SDG-12			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge) TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis) TC-5 (Evaluation) TC-10 (Communication & Collaboration)	
Course Objectives				
Understand fundamental principles of control systems and system behavior. Implement and simulate control systems using modern tools (MATLAB/Simulink).				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Develop mathematical models and transfer functions of electrical and mechanical systems.		C-3	PLO-3 / SA-3
CLO-2	Analyze the stability and performance of feedback control systems using Routh stability criterion, root locus techniques, and transfer function methods.		C-4	PLO--5/ SA-5
CLO-3	Explain the concepts of open-loop and closed-loop control systems, transfer functions, block diagrams, and signal flow graphs.		C-2	PLO-1 / SA-1
CLO-4	Use MATLAB Simulink or any modern tool to evaluate various control blocks outputs.		P-3	PLO-5/ SA-5
CLO-5	Design and simulate controllers and compensators for improving the performance of control systems using appropriate techniques.		P-4	PLO-4 / SA-4
CLO-6	Demonstrate a responsible and systematic approach in analyzing control system stability and performance.		A-2	PLO-7/ SA-7
Course Outline for Theory				

- Introduction to control systems; open-loop and closed-loop systems.
- Transfer functions; block diagrams, signal flow graphs.
- Introduction to modeling; formation of differential equations of electrical, mechanical, and other systems, transfer functions.
- Stability; Routh's stability criterion, types, and analysis of feedback control systems; root locus, transfer function matrices; PID controllers and compensators.

Lab Work Outline for Practical

Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments.

- Using MATLAB for control systems.
- Modelling of physical systems, linear control system modelling.
- LTI Systems.
- First & Second Order system response, Nyquist Criteria, Root-Locus & Bode plots.
- PI, PD and PID controllers.
- Servo motor control.

Recommended Books

1. "Control systems engineering " by Bhattacharya, Sriman Kumar, Pearson Education, 3rd Edition, 2015.
2. "Modern Control Engineering" by Katsuhiko Ogata, Prentice Hall, 5th Edition, ISBN: 0130609072, (2009).
3. "Linear Control System Analysis and Design with MATLAB" by Constantine H. Houpis and Stuart N. Sheldon, 6th Edition, ISBN-13: 978-1466504264, (2013).

(Course Code) and Title (EET-213) Instrumentation and Measurements		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-7, SDG-9		Professional Competence Profile TC-1 (Comprehend & apply universal knowledge) TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis) TC-5 (Evaluation) TC-10 (Communication & Collaboration)	
Course Objectives			
Understand fundamental principles of measurement systems and instrumentation. Select and design appropriate measurement systems for engineering applications. Analyze static and dynamic characteristics of measuring instruments. Implement measurement techniques using modern instruments and tools.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the fundamentals concepts of instrumentation and measurement systems.	C-2	PLO-1 / SA-1
CLO-2	Apply the principles of measurement techniques for practical scenarios and various operations.	C-3	PLO-2 / SA-2
CLO-3	Apply different types of bridges for measurement of resistance, inductance, and capacitance.	C-4	PLO-4 / SA-4
CLO-4	Perform precision measurements and data acquisition experiments using modern instrumentation systems.	P-3	PLO-3 / SA-3

CLO-5	Practice ethical handling of instruments, laboratory safety procedures, teamwork, and effective technical reporting.	P-5	PLO-5/ SA-5
Course Outline for Theory			
- Precision measurements terminologies include resolution, sensitivity, accuracy, and uncertainty. - Engineering units and standards. Principles of different measurement techniques. - Instruments for measuring electrical properties, pressure, temperature, position, velocity, flow rates (mass and volume) and concentration; - systems for signal processing and signal transmission. - Modern instrumentation techniques; - static and dynamic responses of instrumentation and signal conditioning; - basic data manipulation skills using personal computers, graphs and data acquisition systems. - Principles of operation, construction and working of different analog and digital meters, oscilloscope, recording instruments, signal generators, transducers, and other electrical and non-electrical instruments. - Types of bridges for measurement of resistance, inductance, and capacitance; power and energy meters; high-voltage measurements.			
Lab Work Outline for Practical			
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments. - To study and become familiar with Oscilloscope. - Conversion of galvanometer into voltmeter, ammeter, and ohmmeter. - Measurement of Self-Inductance by Three Ammeter Method, Measurement of Capacitance by Three Voltmeter Method. - Wheatstone bridge, Kelvin bridge, Maxwell Bridge, Hay Bridge, Schering Bridge, Wien Bridge. - LDR & RTD, Ultrasonic Sensor. - Electronic Wattmeter & Energy Meter.			
Recommended Books			
“Electronic Measurement and Instrumentation” by Klaas B. Klaassen and Steve Gee, Cambridge University Press, ISBN: 0521477298, 1996. “Electronic Instrumentation and Measurements” by David A. Bell, 3rd Edition. “Instrumentation and Control Systems” by William Bolton, Latest Edition, Elsevier.			

7.4. Engineering Technology Depth Course Contents

(Course Code) and Title (EET-312) Industrial Electronics		Credit Hours (1+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9			Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-5 (Evaluation)	
Course Objectives				
This course aims to develop students' understanding of industrial electronic systems and their applications in modern manufacturing and process industries. Students will learn the principles of industrial heating, motor speed control, process instrumentation, industrial measurement techniques, programmable logic controllers (PLCs), data acquisition, and distributed control systems.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Apply principles of sensors, transducers, and signal conditioning in industrial measurement systems.		C-3	PLO-2/ SA-2
CLO-2	Evaluate the impact of data acquisition, SCADA on the performance of industrial systems.		C-5	PLO-4/ SA-4
CLO-3	Analyze the health and safety issues in the electronics industry.		C-4	PLO-6/ SA-6
CLO-4	Construct techniques to control the industrial process using PLCs and SCADA systems		P-4	PLO-5/ SA-5
CLO-5	Demonstrate professional ethics, teamwork, and effective technical communication while developing and troubleshooting embedded system applications		A-3	PLO-9/ SA-9
Course Outline for Theory				
• Electric heating: Principles and applications; induction and dielectric heating; high-frequency welding. • Spot welding control, Industrial control: Speed control of DC, AC, and servo motors. Process control. • Measurement of non-electrical quantities: Temperature, displacement, pressure, time, frequency; digital industrial measuring systems, Ultrasonic generation and applications. • X-ray applications in industry. • Photo-electric devices, Industrial control using PLCs. Data acquisition. • Distributed control system in process industries, Industrial safety and its techniques to avoid any hazard using proactive approach.				
Lab Work Outline for Practical				
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments. • Experiments related to the principles of welding, electric heating, PLCs • Experiments in speed control of DC, AC, and servo motors • Experiments related to Industrial safety guidelines and its inspection • Measurement systems for process variables • Industrial-oriented projects by adopting the concepts learned from electronics • Ladder logic diagram, wiring diagram, and PLCs and SCADA systems.				
Recommended Books				

1. "Programmable Logic Controllers, Latest Edition, McGraw-Hill.
2. "Industrial Electronics" by Frank D. Petruzella, Latest Edition, McGraw-Hill.
3. "Principles of Industrial Instrumentation" by Patranabis D., Latest Edition, McGraw-Hill.
4. "Industrial Electricity and Motor Controls" by Rex Miller and Mark R. Miller, Latest Edition, McGraw-Hill.

(Course Code) and Title (EET322) Industrial Automation		Credit Hours (1+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9			Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis)	
Course Objectives				
Understand the Industrial automation fundamentals, system architecture, sensors/actuators integration, and transition from relay logic to PLC-based control. Interface HMI and SCADA systems, industrial communication protocols and system integration of PLC–HMI–drives. control panel design, safety systems, troubleshooting, maintenance, and introduction to Industry 5.0 and IoT-based automation.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Analyze automated systems using PLC/SCADA, industrial communication protocols in real-world industrial environments		C-4	PLO-6/ SA-6
CLO-2	Evaluate and troubleshoot automated systems considering safety standards and reliability		C-5	PLO-3/ SA-3
CLO-3	Assemble prototypes of automation /robots on LabVIEW/PLCs according to their usage and specifications		P-4	PLO-5/ SA-5
CLO-4	Build an industrial application-oriented project by adopting the concepts learned from industrial automation		P-5	PLO-11/ SA-11
CLO-5	Demonstrate professional ethics, teamwork, and effective communication while conducting laboratory experiments and interpreting electronic circuit behavior.		A-3	PLO-10/ SA-10
Course Outline for Theory				
• Introduction to Industrial Automation, architecture of industrial automation, Measurement system specifications, industrial measurement. • Temperature, Pressure and Force Sensors, hydraulic, proximity, infrared, light, ultrasonic and radiation sensors, Analog to Digital conversion of sensor output, control of dc and ac motors, stepper motor control, servo motors control, position control friction, backlash and resilience machine tool control, remote position control; process control, pneumatic controllers. • Flow and level Sensors, Programmable Logic Control Systems and their evolution, PLC programming languages, PLC software environment, Ladder logic timers and counters, Ladder programming of practical scenarios. • Industrial Motor Control Circuits. Industrial safety standards, SCADA.				
Lab Work Outline for Practical				
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments. • Measurement system specifications, industrial measurement. • Temperature sensors, Pressure and Force Sensors, Hydraulic, proximity, infrared, light, ultrasonic and radiation sensors, flow and level sensors.				

- Analog to Digital conversion of sensor output.
- Stepper motor control, Servo motors control.
- Position control friction.
- Backlash and resilience machine tool control.
- Remote position control.
- Process control, pneumatic controllers.
- Programmable Logic Control Systems and interfaces of I/O devices.
- Ladder programming Instruction Set.

Recommended Books

1. "Lessons in Industrial Instrumentation" by Tony R. Kuphaldt, all volumes, Samurai Media Limited.
2. "Industrial Automation and Robotics" by K. Kumar, B.S.Babu, Latest Edition, CRC Press.
3. "Control Engineering" by N.M. Morris, 4th Edition, Mc-Graw-Hill.
4. "AI and Industry 5.0: Impact on Automation" by Sitanath Biswas, Sarkar, IIP Iterative International Publishers.
5. "Industry 5.0: The Human-Centric Future of Industry." by Hammad, Muhammad, et al. Springer.

(Course Code) and Title (EET-321) VLSI Technology		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK3 (Engineering Fundamentals)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis), TC-10 (Communication & Collaboration)	
Course Objectives			
To understand the fundamental concepts of Front-End and Back-End integrated circuit (IC) design			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Understand the general concept of VLSI Technology methodologies.	C-2	PLO-1/ SA-1
CLO-2	Analyze different types of VLSI Front-End/Back-End techniques.	C-4	PLO-3/ SA-3
CLO-3	Evaluate different solutions for Front-End/Back-End IC problems.	C-5	PLO-4/ SA-4
CLO-4	Reproduce the basic Front-End IC level of abstractions to manage the lab project	P-3	PLO-5/ SA-5
CLO-5	Understand the general concept of VLSI Technology methodologies.	A-2	PLO-9/ SA-9
Course Outline for Theory			
• Introduction to VLSI, VLSI Challenges, Major Approaches in VLSI, ASIC, FPGA, PLD, PLA, PAL etc., Levels of Abstraction. • IC fabrication processes such as Lithography, Oxidation Processes, Etching, Ion Implantation etc. IC Layout design rules. • Types of IC Packages such as Dual in-line package (DIP), Pin grid array (PGA), Ball grid array (BGA) etc. • Physical Structure of CMOS ICs Electrical Characteristics of MOSFETs, FET RC Model, Junction Capacitances. • DC characteristics of CMOS Inverter, Propagation Delay, Noise Margin, Timing/Sizing, Power Consumption of Transistor, Propagation Delay Models.			

- Static & Dynamic Logic Circuits such as Pull-Up/Pull-Down Logic, Transmission gates, Tri-state buffers, Pass Transistor logic, Pseudo logic, Nora Logic etc.
- Understanding of Verification Techniques, Simulation based Verification & Test Bench using Structural & Behavioural Modelling of Combinational & Sequential Logic Circuits with VHDL/Verilog language.
- Introduction to Clock Hold/Setup Time, Clock Jitter/Skew etc., Clock Distribution Architectures.

Lab Work Outline for Practical

Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments.

- Introduction to SPICE, DSCH (Digital Schematic), MICROWIND & EDA/CAD tools
- PN-Junction, MOSFET modeling and simulation
- Implementation of CMOS gates Schematic
- BJT Modeling, BJT Noise Modeling
- Implementation of CMOS Basic gates Layout using MICROWIND & EDA/CAD tools
- Structural & Behavioral Modeling of Combinational & Sequential simple Logic Circuits with VHDL/Verilog language.

Recommended Books

1. "Digital Integrated Circuits" by Jan M. Rabaey, A. Chandrakasan, Borivoje Nikolic, Pearson Publisher.
2. "CMOS VLSI Design: A Circuits & Systems Perspective" by N. Weste, David Harris, Pearson Publisher.
3. "Circuit Design for CMOS VLSI" by John P. Uyemura, Springer Science & Business Media.
4. "Principles of CMOS VLSI Design: A System Perspective" by N. Weste & K. Eshraghian, McGraw Hill.
5. "Verilog Computer-Based Training Course", Zainalabedin Navabi, McGraw-Hill.

(Course Code) and Title (EET-313) Electronics Troubleshooting and Repair		Credit Hours (0+2)		Pre-Requisite None	
Knowledge & Attitude Profile SK6 (Engineering Technologies)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)	
Sustainable Development Goals (SDGs) SDG-8, SDG-9			Professional Competence Profile TC-5 (Evaluation) TC-10 (Communication & Collaboration)		
Course Objectives					
To operate multimeters, oscilloscopes, function generators, and power supplies for circuit, interpret complex schematics, PCBs to trace faults. Electronics troubleshooting and repair lab to diagnose, disassemble, and repair electronic equipment. Understanding of precision hand tools, diagnostic test instruments, soldering/desoldering stations, and safety equipment to protect both the technician and the sensitive components.					
Course Learning Outcomes	CLOs Statement			Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Adapt troubleshooting and testing techniques using modern tools in electronic circuits under test.			P-6	PLO-5/ SA-5
CLO-2	Display professional commitment and ethics towards equipment and circuits troubleshooting and testing.			A-5	PLO-7/ SA-7
Lab Work Outline for Practical					
Following is the tentative list of experiments. Institutions depending on their needs and available resources can add or remove experiments.					
• Electronic circuit troubleshooting, testing & repair • Safety guidelines for troubleshooting, testing & repair • High voltages and high currents safety guidelines					

- Fault finding techniques and repair practices in electric/electronic circuits
- EDA/CAD Tools used in troubleshooting, testing & repair of electronic circuits
- Test & repair electric/electronic boards
- Test & replace electronic components on PCB, practice more to enhance the troubleshooting and testing skills.

Recommended Books

1. "Electrician's Troubleshooting and Testing Pocket Guide" by Frank D. Petruzella McGraw-Hill.
2. "Troubleshooting Electronic Circuits: A Guide to Learning" by Ronald Quan, McGraw-Hill.
3. "Everything Electrical How to Test Circuits Like A Pro – all Parts" by Vincent Keler, independently published.
4. "Electronic Troubleshooting" by Daniel R. Tomal, Aram Agajanian, McGraw Hill LLC.
5. "How to Diagnose and Fix Everything Electronic" by Michael Jay Geier, Latest Edition, McGraw-Hill.

(Course Code) and Title (EET-XXX) FPGA-based Technology		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK6 (Engineering Technologies)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9		Professional Competence Profile TC-3 (Problem Analysis) TC-4 (Design and development of solutions) TC-5 (Evaluation) TC-10 (Communication & Collaboration)	
Course Objectives			
To develop the fundamental concepts of the digital electronic circuits in Field Programmable Gate Arrays (FPGAs).			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Compare the FPGA programmable technology and the logic design process	C-2	PLO-1/ SA-1
CLO-2	Apply the combinational and sequential circuits using Hardware description language	C-3	PLO-3/ SA-3
CLO-3	Interpret the EDA flow using hardware descriptive language in FPGAs	C-2	PLO-5/ SA-5
CLO-4	Build experiment related to FPGA design, HDL coding, simulation, and hardware implementation of digital systems.	P-3	PLO-11/ SA-11
CLO-5	Present results of FPGA designs using FPGA kits (or equivalent development boards) and participate in group-based projects with professional ethics.	A-2	PLO-8/ SA-8
Course Outline for Theory			
• Introduction to FPGA, FPGA Challenges, FPGAs interfacing and different levels of Abstraction • Hardware Description Languages (HDL); Selection of HDL Language, Fundamentals of Language, Modeling of combinational & sequential circuits, simulation & synthesis. • Programmable Array Logic (PAL), Programmable Logic Array (PLA), Complex Programmable Logic Devices (CPLD), Field Programmable Gate Array (FPGA) Technologies • Arithmetic Algorithms and Hardware using FPGAs technologies, Block RAMs in FPGAs & modeling of RAM/ROM using HDL • FPGA Design Flows, Physical Design Automation -- Systems; Partitioning; Placement; Routing, Clock Design			

Considerations -- Timing Margins, Clock Skew, Clock Distribution, use of test benches for synthesis, simulation, testing and floor planning, Digital circuits Examples and Applications in-line with IR 5.0 requirements

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Introduction to FPGA kits (or equivalent development boards)
- Introduction to Software Tools (ModelSim, Xilinx ISE, Vivado Design Suite etc.)
- Introduction to FPGA Boards and Simple Circuit Implementation
- Introduction to data flow modeling, behavioral modeling, Simulation, synthesis & fitting of combinational/sequential logic circuits
- Introduction to implementation of Finite State Machine (FSM) and memory
- Realizations of digital circuits using FPGA.

Recommended Books

1. "FPGA-Based System Design" by Wayne Wolf, Prentice Hall.
2. "Verilog HDL" by Samir Palnitkar, Prentice Hall.
3. "Advanced Digital Design with the Verilog HDL" by Michael D. Ciletti, Prentice Hall.
4. "FPGA Prototyping by Verilog Examples: Xilinx Spartan-3" by Pong P. Chu, Wiley-Interscience.

(Course Code) and Title (EET-XXX) Opto-Electronic Devices		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK6 (Engineering Technologies)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-10 (Communication & Collaboration)	
Course Objectives				
The primary objectives of optoelectronic devices are to understand the conversion of electrical energy into light (emission) or light into electrical energy (detection/sensing) by manipulating photon-electron interactions in semiconductors.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Understand the principles of optoelectronics, including light–matter interaction, optical waveguides, and emission/detection mechanisms.		C-2	PLO-1/ SA-1
CLO-2	Analyze the characteristics and performance of optoelectronic components such as LEDs, lasers, and photodetectors used in optical systems.		C-4	PLO-2/ SA-2
CLO-3	Evaluate the opto-electronic systems for practical constraints such as optical coupling, alignment, and signal integrity.		C-5	PLO-4/ SA-4
CLO-4	Organize experiments in laboratory in order to interpret experimental data results using opto-electronic devices.		P-4	PLO-5/ SA-5
CLO-5	Display professional commitment and ethics towards equipment and circuits troubleshooting and testing.		A-5	PLO-7/ SA-7
Course Outline for Theory				
• An introduction to optoelectronics, Introduction to optical materials, Incandescent, discharge, and arc lamp sources, • Detection of optical radiation. Propagation along optical fibers and waveguides				

- Introduction to lasers and optical amplifiers, Basic concepts in photometry, radiometry, and calorimetry.
- Light emitting diodes (LEDs), Semiconductor lasers, Optical detectors and receivers, Optical amplifiers, Ultrafast optoelectronics, Organic light emitting devices.

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Introduction To Optoelectronic Devices
- Fiber Optic Transmitter Through Digital Circuit
- Analog and digital signals through the Optical Fiber
- Optical Fiber Receiver Circuit, Optical Couplers
- To Determine the Numerical Aperture of Optical Signal
- Study The Optical (E-O) Characteristics of Fiber Optic 660nm Converter
- Triangular Wave through the Optical Fiber
- Amplitude Modulated Signal through the Optical Fiber, Types of modulation techniques
- Light Dependent Resistor, Making A Light Guide Circuit
- Losses In Optical Fiber
- Frequency Modulated Signal through the Optical Fiber

Recommended Books

1. "Handbook of Optoelectronics: Concepts, Devices, and Techniques" By John P. Dakin, Robert Brown, Published by CRC Press, ISBN 9780367735678.
2. "Optoelectronic Devices and Properties" by Oleg Sergiyenko, Autonomous University of Baja California, Mexico, ISBN: 978-953-307-204-3.
3. "Semiconductor Optoelectronic Devices: Introduction to Physics and Simulation" by Joachim Piprek.

(Course Code) and Title (EET-XXX) Robotics Technology	Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK6 (Engineering Technologies)	Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)	
Sustainable Development Goals (SDGs) SDG-8, SDG-9		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis), TC-5 (Evaluation) TC-10 (Communication & Collaboration)	
Course Objectives			
The primary objective of robotics technology is to build and operate intelligent machines that assist humans, improve productivity, and enhance safety across various sectors.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Classify various robotic structures and their workspace.	C-2	PLO-1/ SA-1
CLO-2	Analyze the forward, inverse and differential kinematics of robotic systems.	C-4	PLO-2/ SA-2
CLO-3	Evaluate the performance of robotic control systems for motion control.	C-5	PLO-3/ SA-3
CLO-4	Perform experiments in laboratory in order to interpret experimental data results using Robotics Technology	P-5	PLO-5/ SA-5
CLO-5	Demonstrate professional commitment and ethics towards equipment and circuits troubleshooting and testing.	A-3	PLO-8/ SA-8
Course Outline for Theory			

- Fundamental of robotics: Classification of robotic systems, Robot anatomy and related attributes.
- Degree of freedom, types of joints/links, common robot configurations, Kinematics of serial robots, screw-based mechanics.
- Robot control system: Fundamentals of robot controllers, including analysis and design tools, Robot components, robot characteristics, robot languages, and robotic applications in line with Industry 5.0, Common robot sensors and actuators knowledge

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Differential drive kinematics, Forward and inverse kinematics.
- Path planning and obstacle avoidance.
- 2D mapping and occupancy grid map.
- Image acquisition, processing and reasoning.
- Localization and mapping.
- High level control architecture of mobile robots.
- Vision-guided vehicle control.

Recommended Books

1. "Introduction to Robotics: Mechanics and Control" By John J. Craig, Latest Edition, Pearson/Prentice Hall.
2. "Introduction to Robotics: Analysis, Control, Applications" by Saeed B. Niku, 3rd Edition, John Wiley & Sons.
3. "Fundamentals of Robotics: Analysis and Control" by Schilling. R. J., Latest Edition, Prentice-Hall.
4. "Design and Optimization of Mobile Robotics for Industry 5.0" by Rathishchandra R. Gatti, C. Singh, Latest Edition, Wiley.
5. "Robotics Control Sensing, Vision and Intelligence" by Gonzalex, R. C. and Fu, K. S, Latest Edition, McGraw-Hill.
6. "Robotics Technology and Flexible Automation" by S. R. Deb and Sankha Deb, Latest Edition, McGraw-Hill Education.

(Course Code) and Title (EET-XXX) Digital Signal Processing		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK6 (Engineering Technologies)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9		Professional Competence Profile TC-2 (Comprehend & apply local knowledge) TC-4 (Design and development of solutions), TC-10 (Communication & Collaboration)	
Course Objectives			
The primary objectives of Digital Signal Processing (DSP) are to analyze, modify, or enhance digitized signals (such as audio, video, and sensor data) using computational algorithms to extract meaningful information.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Apply the sampling on continuous-time signals (i.e. aliasing, quantization errors, pre-filtering).	C-2	PLO-3/ SA-3
CLO-2	Analyze the properties of LTI systems in terms of z-transforms.	C-4	PLO-2/ SA-2
CLO-3	Evaluate the problems related to frequency selective processing and FIR/IIR filters.	C-5	PLO-4/ SA-4
CLO-4	Measure the relevant theoretical knowledge to analyze discrete-time signals and systems	P-4	PLO-6/ SA-6

CLO-5	Display professional commitment and ethics towards equipment and circuits troubleshooting and testing.	A-5	PLO-7/ SA-7
Course Outline for Theory			
Overview of basic concepts of Signals and Systems, Applications of DSP, Analog to Digital Signal Conversion, Nyquist Rate Sampling, Aliasing, Quantization, Correlation, Auto-Correlation, Introduction to Fast Fourier Transform, Introduction to Z-Transform, Properties of Z-Transform, Inverse Z-Transform, Digital Filters and their Applications, Digital Filter Design by Pole Zero Placement Method, Design of FIR Filters, Design of IIR Filters.			
Lab Work Outline for Practical			
Following is the tentative list of experiments: - To study the architecture of DSP chips such as TMS 320C 5X/6X Instructions - To verify linear convolution - To verify the circular convolution - To design FIR filter (LP/HP) using windowing technique Using rectangular window Using triangular window Using Kaiser window - To Implement IIR filter (LP/HP) on DSP Processors N-point FFT algorithm - MATLAB program to generate sum of sinusoidal signals - MATLAB program to find frequency response of analog LP/HP filters - To compute power density spectrum of a sequence.			
Recommended Books			
"Discrete time Signal Processing" by Alan V. Oppenheim and Ronald W. Schaffer, Latest Edition "Digital Signal Processing" by John G. Proakis and Dimitris G. Manolakis, Latest Edition.			

(Course Code) and Title (EET-XXX) Nanotechnology		Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK6 (Engineering Technologies)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9		Professional Competence Profile TC-3 (Problem Analysis), TC-10 (Communication & Collaboration)	
Course Objectives			
To understand the creation of, characterization of, and manipulation of nanoscale materials, systems, and devices and how they can be exploited for new applications. To learn about exciting applications of nanotechnology at the leading edge of scientific research.			
Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the basic concept of nanotechnology.	C-2	PLO-3/ SA-3
CLO-2	Analyze the Microscopy techniques at Nanoscale level.	C-2	PLO-1/ SA-1
CLO-3	Analyze and construct experimental data and measure results of nanomaterials.	C-4	PLO-4/ SA-4
CLO-4	Display professional commitment and ethics towards equipment and circuits troubleshooting and testing.	P-5	PLO-11/ SA-11
Course Outline for Theory			
Nanoscale science and nanotechnology are broad, interdisciplinary areas, encompassing not just materials science but everything from biochemistry to electrical engineering and more. This will be a survey course			

introducing some of the fundamental principles behind nanotechnology and nanomaterials, as well as applications of nanotechnology.

- The role of solid-state physics and chemistry in nanotech will be emphasized in line with IR 5.0. Nanoscale tools such as surface probe and atomic force microscopy, nanolithography, and special topics such as molecular electronics will also be covered.

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Study of noble metal colloidal nanoparticles
- Study of SERS (Surface Enhanced Raman Spectroscopy)-sensing efficiencies by calculating their analytical and surface enhancement factors
- Study of nanoparticle adsorption to solid surfaces and other spatially-dependent characteristics of nanoparticle-surface interactions
- Study of terahertz spectroscopy of nanomaterial composite systems
- Study of fabrication of graphene nanosheets and electrode coating
- Study of electrochemical performance analyses of nanomaterials and Li-ion cell batteries.

Recommended Books

- "Introduction to Nanotechnology" by Charles P. Poole, Jr., Frank J. Owens, Latest Edition, Wiley
- "Nanotechnology: Principles and Practices" by Sulabha K. Kulkarni, 3rd Edition, Springer books.
- "Introduction to Nano: basics to nanoscience and nanotechnology" by A. Sengupta; C. Kumar Sarkar, Latest Edition, Springer.
- "Industry 5.0: Design, standards, techniques and applications for manufacturing" by Leong, Wai Yie, The Institution of Engineering and Technology (IET), 2024.

(Course Code) and Title (EET-323) Power Electronics		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK6 (Engineering Technologies)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9			Professional Competence Profile TC-3 (Problem Analysis), TC-8 (Ethics) TC-10 (Communication & Collaboration)	
Course Objectives				
To develop the understanding of the semiconductor devices and circuits for the conversion of different electrical power into a required form. Introduce the applications of power electronics including rectifiers, inverters, DC-DC converters, and AC controllers.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:			
CLO-1	Understand the fundamentals of power electronics devices and their applications in power electronics converters		C-2	PLO-1/ SA-1
CLO-2	Analyze different types of AC-DC, DC-DC, DC-AC, and AC-AC converters under different loading conditions		C-4	PLO-4/ SA-4
CLO-3	Demonstrate the use of power electronics converters for modern societal applications		P-5	PLO-5/ SA-5
CLO-4	Work effectively as an individual or in a group while performing laboratory experiments.		A4	PLO-9/ SA-9
CLO-5	Report effectively the laboratory work including procedures, results and conclusion of experiments		P-2	PLO-8/ SA-8
Course Outline for Theory				

- Introduction to power electronics; solid-state devices used in power electronics: power diode. Power BJT, power MOSFET, SCR, GTO, GBT, TRIAC, DIAC. Semi controlled, fully-controlled and uncontrolled rectifiers: single-phase and three-phase, six-pulse, twelve-pulse and twenty-four pulse rectifiers. Single-phase and three-phase inverters; pulse-width-modulated (PWM) inverters. UPS; types of converters; switched mode power supplies, AC and DC motor drives.

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Controlled and Uncontrolled Rectifiers
- TRIAC Characteristics
- SCR Characteristics
- Single Phase Controlled rectifiers
- 3 Phase Controlled rectifiers
- Buck Converter
- First Quadrant Chopper (DC Motor Speed Control)
- AC Power Control Using TRIAC-DIAC Combination
- PWM Inverter.

Recommended Books

1. “Power Electronics” by Cyril W. Lander, 3rd Edition, McGraw-Hill.
2. “Power Electronics: Circuits, Devices and Applications” by H.M. Rashid, 4th Edition, Prentice Hall.
3. “Power Electronics: Converters, Applications, and Design” by Ned Mohan, Tore M. Undeland, and William P. Robbins, Latest Edition, Wiley.

(Course Code) and Title (EET-XXX) Electric Vehicle Technology		Credit Hours (2+1)	Pre-Requisite None		
Knowledge & Attitude Profile SK4 (Specialist Knowledge)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)	
Sustainable Development Goals (SDGs) SDG-8, SDG-9			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge)		
Course Objectives					
To acquire in-depth knowledge of electric motors, power electronics, inverter technology, and drive systems and to understand EV charging station design, grid integration, and communication protocols.					
Course Learning Outcomes	CLOs Statement			Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the types, architecture, components, and operating principles of electric vehicles.			C-2	PLO-1/ SA-1
CLO-2	Analyze EV subsystems including batteries, Battery Management Systems (BMS), power electronics, and electric motor drives.			C-3	PLO-3/ SA-3
CLO-3	Evaluate EV charging technologies, embedded control systems, grid integration, safety standards, and emerging trends.			C-4	PLO-4/ SA-4
CLO-4	Organize and present experimental results of EV systems in written reports and graphical/analytical format.			P-4	PLO-6/ SA-6
CLO-5	Study effectively in group activities and discussions while maintaining professional ethics during EV lab work and projects.			A-3	PLO-8/ SA-8
Course Outline for Theory					

- History and evolution of electric vehicles (global and Pakistan). Types of EVs: BEV, HEV, PHEV, and emerging types.
- EV architecture and system overview, key components and energy flow. Government policies and regulations including Pakistan EV Policy 2025–2030.
- Environmental and economic impact of EV adoption. Battery technologies: lithium-ion, lead-acid, and emerging batteries. Battery parameters: State of Charge (SoC), State of Health (SoH), energy and power density. Battery pack design and thermal management. Battery Management Systems (BMS): functions and protection.
- Power electronics in EVs: DC-DC converters, inverters, MOSFETs, IGBTs. Electric motors: DC, BLDC, Induction, PMSM. Motor characteristics and selection for bikes, rickshaws, and cars.
- Embedded systems in EVs: microcontrollers, sensors, actuators. Basics of CAN communication. Charging technologies: Level 1, Level 2, DC fast charging. Charging standards, connectors, and plugs. On-board and off-board chargers. Home charging system setup. Public charging station design.
- EV integration with power grid and load management. Introduction to vehicle-to-grid (V2G). Solar-powered EV charging systems. Regenerative braking systems. EV safety considerations and standards. Future trends and challenges in EV technology

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Introduction to EV components through hardware demonstration or virtual lab
- Simulation of EV powertrain using tools such as MATLAB/Simulink. Study and testing of battery characteristics (charging/discharging curves, SoC estimation).
- Analysis of basic Battery Management System (BMS) functions.
- DC motor speed control using PWM techniques.
- BLDC motor interfacing and control using a microcontroller.
- Analysis of inverter circuits for motor driving. Study of DC-DC converters (buck/boost) for EV applications. Interfacing sensors with microcontrollers.
- Introduction to CAN communication with simple node setup and data transmission.
- Design and simulation of EV charging circuits (Level 1/Level 2 concept).
- Simulation of solar-powered EV charging system.
- Demonstration or simulation of regenerative braking concept.
- Conversion of a conventional vehicle (e.g., bike or small rickshaw) into an electric vehicle, including removal of IC engine components, selection and installation of motor, battery pack, controller, and basic wiring integration.

Recommended Books

- “Electrical Vehicle Technology Explained” by James Larminie, John Lowry, 2nd Edition, Wiley books.
- “Automotive Electricity and Electronics” by James. D. Halderman, 5th Edition, Pearson Education.
- “Electric and Hybrid Vehicles” by Tom Denton and Hayley Pells, Latest Edition, Routledge.

(Course Code) and Title (EET-XXX) Embedded Systems & IoT Application	Credit Hours (2+1)	Pre-Requisite None
Knowledge & Attitude Profile SK4 (Specialist Knowledge)	Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9	Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-5 (Evaluation)	
Course Objectives		

To understand the architecture of embedded processors, microcontrollers, and memory systems and to apply engineering principles to resolve complex hardware-software integration problems.

Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
	After completion of this course students will be able to:		
CLO-1	Explain microcontroller architecture, memory systems, GPIO operation, and embedded programming using any programming language for hardware-level control.	C-2	PLO-1/ SA-1
CLO-2	Evaluate integrated embedded and IoT systems with real-time constraints, including RTOS concepts, system debugging, testing, and validation.	C-5	PLO-4/ SA-4
CLO-3	Work on experiments/tasks related to microcontroller programming, sensor/actuator interfacing, and embedded system development independently.	P-3	PLO-5/ SA-5
CLO-4	Organize and present experimental results of embedded and IoT systems in written reports and graphical/analytical format.	P-4	PLO-6/ SA-6
CLO-5	Participate effectively in group activities and project-based work while maintaining professional ethics during embedded and IoT lab experiments.	A-3	PLO-8/ SA-8

Course Outline for Theory

- Embedded Systems fundamentals and applications in modern engineering domains and Industry 5.0.
- Microcontroller architecture with emphasis on RISC-based design, instruction sets, and overview of memory types including Flash, SRAM, and EEPROM. GPIO architecture and configuration for input/output operations.
- Embedded system programming using python or C/C++ with focus on low-level hardware control. Sensor and actuator interfacing, including both analog and digital sensors, signal conditioning, and data acquisition techniques.
- Communication protocols for embedded systems such as UART, SPI, and I2C. Fundamentals of IoT architecture include sensing layer, network layer, and application layer. Device-to-cloud communication using IoT protocols such as MQTT and HTTP.
- Cloud integration using IoT platforms for data visualization, monitoring, and control. Wireless communication technologies for IoT including Wi-Fi, Bluetooth, and introduction to low-power wide-area networks (LPWAN).
- Real-time embedded systems with introduction to Real-Time Operating Systems (RTOS), tasks, scheduling, and interrupts. System integration of embedded and IoT modules into complete applications. Debugging, testing, and validation techniques for embedded and IoT systems including hardware-software co-verification. Introduction to edge computing concepts and energy-efficient IoT design considerations.

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Microcontroller setup and environment installation.
- GPIO programming using any programming language for LED, switch, and relay control.
- Timer and interrupt-based programming for real-time control applications.
- ADC interfacing for analog sensors such as temperature, light, and potentiometers.
- Digital sensor interfacing using I2C and SPI protocols UART communication between microcontroller and PC or external modules. Motor control using PWM techniques).
- Sensor data acquisition Debugging of embedded system using serial monitor and logic analysis.
- IoT node development using Wi-Fi or Bluetooth modules. Device-to-cloud data transmission using MQTT or HTTP protocols.
- Cloud dashboard creation for real-time monitoring and visualization.
- RTOS-based task creation, scheduling, and multitasking experiments.
- Edge device integration with cloud platforms for remote monitoring and control. Testing and validation.

Recommended Books	
1.	"Embedded Systems and IoT: Foundations, Design, and Smart Applications" by James Larminie, John Lowry, 2nd Edition, International Kindle.
2.	"Embedded Systems and IoT" by J Sylvia Grace, Sandeep Sharma, Latest Edition, San International Scientific.
3.	"Industry 5.0, Key Technologies and Drivers" by I. Sarkar, A. Hazra, P. Maurya, Springer.
4.	"Wearable and Neuronic Antennas for Medical and Wireless Applications", by Arun Kumar, Manoj Gupta, M. Kumar Sharma, John Wiley & Sons.
5.	"Exploring Arduino: Tools and Techniques for Engineering" Wizardry by Jeremy Blum, Latest Edition, Wiley.

(Course Code) and Title (EET-XXX) Renewable Energy Integration	Credit Hours (3+1)	Pre-Requisite None
Knowledge & Attitude Profile SK4 (Specialist Knowledge)	Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirement) SP3 (Depth of Analysis Required)	Range of Engineering Activities TA1 (Range of Sources) TA2 (Level of Interactions) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-8, SDG-9		Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-4 (Design and development of solutions) TC-5 (Evaluation) TC-10 (Communication & Collaboration)

Course Objectives
To gain a comprehensive understanding of various renewable energy technologies, including solar PV, wind turbines (onshore/offshore), geothermal, and biomass, along with their scientific principles. Evaluate the technical challenges and solutions associated with integrating variable renewable energy into existing transmission and distribution networks

Course Learning Outcomes	CLOs Statement	Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Explain the fundamentals of renewable energy sources, energy conversion principles, and system configurations including solar, wind, and hybrid systems.	C-2	PLO-1/ SA-1
CLO-2	Analyze power electronics, energy storage systems, and grid integration techniques used in renewable energy systems.	C-3	PLO-3/ SA-3
CLO-3	Evaluate renewable energy integration concepts including smart grids, MPPT, microgrids, IoT-based monitoring, and emerging technologies.	C-4	PLO-4/ SA-4
CLO-4	Present experimental results of renewable energy systems including simulations and LabVIEW-based analyses in written reports and graphical/analytical format.	P-5	PLO-11/ SA-11
CLO-5	Participate effectively in group activities and project work while maintaining professional ethics during renewable energy lab experiments and system integration tasks.	A-3	PLO-8/ SA-8

Course Outline for Theory
• Introduction to renewable energy sources and global energy transition trends in line with IR 5.0. • Overview of solar, wind, hydro, and hybrid energy systems. Fundamentals of energy conversion principles and system efficiency. Electrical characteristics of renewable energy sources and variability issues. • Power electronics for renewable integration including rectifiers, DC-DC converters, and inverters. Grid-connected and off-grid renewable energy systems. Maximum Power Point Tracking (MPPT) techniques for solar PV systems. • Smart grid fundamentals and distributed generation concepts. Grid synchronization techniques and power quality issues. Net metering concepts and policies related to renewable integration.

- IoT-based energy monitoring and control in renewable systems. Protection systems in renewable energy installations including fault detection and isolation. Environmental and economic analysis of renewable energy systems. Case studies of renewable energy integration projects in Pakistan and globally.
- Emerging trends such as vehicle-to-grid (V2G), smart inverters, and AI-based energy optimization. Digital twins, cyber-physical energy systems, and human-centric energy management for Industry 5.0.

Lab Work Outline for Practical

Following is the tentative list of experiments:

- Introduction to renewable energy system components and safety procedures.
- Solar PV system analysis including I-V and P-V characteristics under varying conditions.
- MPPT algorithm implementation and performance evaluation using simulation tools.
- DC-DC converter design and output waveform analysis.
- Inverter operation and waveform generation for single-phase systems.
- Battery charging and discharging characteristics with State of Charge (SoC) estimation.
- Integration of solar PV with battery storage for energy management.
- Wind energy system performance analysis and comparison with solar systems.
- Grid synchronization concept and basic inverter interfacing with electrical grid (simulation-based).
- Sensor-based energy monitoring for voltage, current, and power measurement using data acquisition systems.
- Development of real-time energy monitoring dashboards and system visualization using LabVIEW.
- Hybrid renewable energy system design and simulation (solar, wind, storage, and load integration).
- Mini project: design and evaluation of a complete renewable energy system with monitoring and control features.

Recommended Books

1. "Integration of Renewable Sources of Energy" by Felix A. Farret, M. Godoy Simoes, 2nd Edition, Wiley.
2. "Smart Construction and Industry 5.0: Renewable Energy Integration, Digitalization, Robotics, and Sustainability" by A. Mateen K, W. S. Alaloul, CRC press.
3. "Industry 5.0 and Emerging Technologies" by A. Chakir, R. Bansal, M. Azzouazi, Latest Edition, Springer.
4. "Solar Photovoltaic Basics" by Sean White, Latest Edition, Routledge.

7.5. Engineering Technology Interdisciplinary Course Contents

(Course Code) and Title (EEI-211) AI for Electronics Technology		Credit Hours (2+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK2(Data Analysis) SK6 (Engineering Technologies) SK8(Technological Literature)		Range of Problem Identification & Solving SP2 (Range of Conflicting Requirement) SP5 (Extent of Applicable Codes)		Range of Engineering Activities TA1 (Range of Sources) TA3 (Innovation)
Sustainable Development Goals (SDGs) SDG-4, SDG-17			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis), TC-4 (Evaluation)	
Course Objectives				
After completion of this course, students will be able to understand and analyze the fundamental concepts of Artificial Intelligence and Machine Learning, data handling and preprocessing techniques, and AI algorithms for solving electronics engineering technology problems related to signals, sensors, embedded systems, and intelligent electronics applications, along with implementation and validation of AI models through laboratory work and interpretation of results.				
Course Learning Outcomes	CLOs Statement			Taxonomy (Level)
CLO-1	After completion of this course students will be able to: Understand fundamental concepts of Artificial Intelligence (AI) and its relation to electronics technology systems.			Program Learning Outcomes (PLO) C-2 PLO-1 / SA-1
CLO-2	Apply data preprocessing techniques and machine learning algorithms to solve electronics technology problems using modern ICT tools.			C-3 PLO-3 / SA-3
CLO-3	Analyze and compare performance of AI/ML models, interpret results, and select appropriate techniques for electronics applications.			C-4 PLO-4 / SA-4
CLO-4	Demonstrate practical skills by performing machine learning tasks on electronics datasets, integrating AI systems, and effectively presenting results with proper communication.			P-4 PLO-3 / SA-3
Course Outline for Theory				
- Artificial Intelligence (AI) in electronics covers the concepts of AI, Machine Learning (ML), and Deep Learning (DL), along with their roles in modern electronic systems and applications such as smart sensors, IoT devices, and industrial automation. - The course introduces data handling techniques for electronic systems, including preprocessing methods such as filtering and normalization, and feature extraction from electronic signals/data. - Fundamental machine learning techniques are covered through supervised learning methods including linear regression and classification algorithms (KNN, Decision Trees), as well as unsupervised learning techniques such as K-means clustering, with emphasis on model training and testing. - Applications of AI in signal and image processing include signal classification, introductory concepts of Artificial Neural Networks (ANN) and Convolutional Neural Networks (CNN), and basic image recognition techniques.				
Lab Work Outline for Practical				
The laboratory component is designed to develop psychomotor skills by enabling students to progress from guided execution of AI/ML tasks to independent implementation and integration of intelligent electronic systems. Students will gain hands-on experience in data acquisition, preprocessing, model development, and performance evaluation.				

- The laboratory includes an introduction to Python and its machine learning libraries, such as Scikit-learn, NumPy, Pandas, and TensorFlow/PyTorch. It also incorporates a mini-project focused on the implementation of an AI-based electronic system, such as a smart temperature controller, fault detection system, or gesture recognition system.

Recommended Books

- "Machine Learning and Artificial Intelligence in Electronics Design" by Dr. J. Refonaa, Lap Lampert Academic Publishing, 2024.
- "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, 4th Edition, Pearson, 2021.
- "Pattern Recognition and Machine Learning (Information Science and Statistics)" by Christopher M. Bishop, Springer, 2006.
- "Hands-On Machine Learning with Scikit-Learn and PyTorch: Concepts, Tools, and Techniques to Build Intelligent Systems" by Aurélien Géron, 1st Edition, O'Reilly Media, 2025.
- "Artificial Intelligence and Industry 5.0" by G. Narahari Sastry, H. Jyoti Mahanta, A. Kumar, and S. Nagamani, PHI Learning Pvt. Ltd., 2025.

(Course Code) and Title (EEI-121) Computer Programming		Credit Hours (1+1)	Pre-Requisite None	
Knowledge & Attitude Profile SK4(Specialist Knowledge) SK6 (Engineering Technologies) SK8(Technological Literature)		Range of Problem Identification & Solving SP3 (Depth of Analysis Required) SP4 (Familiarity of Issues)		Range of Engineering Activities TA1 (Range of Sources) TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4, SDG-17			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-2 (Comprehend & apply local knowledge) TC-3 (Problem Analysis), TC-4 (Evaluation)	
Course Objectives				
After completion of this course, students will be able to understand and analyze the fundamental concepts of programming, algorithms, data types, operators, control structures, functions, arrays, pointers/references, strings, and file handling techniques, and develop problem-solving skills through implementation, debugging, and validation of programs in laboratory work with interpretation of results.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	Explain the fundamental concepts of programming and analyze program behavior to identify and correct errors.		C-2	PLO-1 / SA-1
CLO-2	Apply the acquired knowledge to write small to moderate scale programs to solve computing problems.		C-3	PLO-3 / SA-3
CLO-3	Execute computer programs by writing correct syntax and removing errors.		P-3	PLO-4 / SA-4
CLO-4	Present the experiments performed in laboratory with interpretation of data and results.		A-2	PLO-9/ SA-9
Course Outline for Theory				
- Fundamental concepts of algorithms and programming - Variables, data types, operators - Conditional structures, repetitive structure - Functions, arrays, pointers/references, strings, lists, recursion - File handling techniques.				
Lab Work Outline for Practical				

- The laboratory component is designed to develop psychomotor skills by enabling students to progress from guided program development to independent implementation and debugging of computer programs. Students will gain hands-on experience in algorithm development, program execution, problem solving, and result interpretation using C++/Python.
- The laboratory includes practical exercises on data types, operators, conditional and repetitive statements, functions, recursion, arrays, strings, pointers/references, structures, and file handling techniques. It also incorporates open-ended programming tasks focused on program design, testing, debugging, and implementation of real-world problem-solving applications.

Recommended Books

- "Introduction to Computation and Programming Using Python" by John V. Guttag, 3rd Edition, The MIT Press, 2021.
- "Object-Oriented Programming Using C++" by Joyce Farrell, 4th Edition, Pearson, 2008.
- "C++ How to Program" by Paul Deitel and Harvey Deitel, 10th Edition, Pearson, 2016.

(Course Code) and Title (EEN-121) Differential Equations		Credit Hours (2+0)	Pre-Requisite None	
Knowledge & Attitude Profile SK1(Natural Sciences) SK2 (Mathematics)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP3 (Depth of Analysis Required)		Range of Engineering Activities TA5 (Familiarity)
Sustainable Development Goals (SDGs) SDG-4			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge), TC-3 (Problem Analysis)	
Course Objectives				
After completion of this course, students will be able to understand and solve the ordinary differential equations, Laplace transforms, and power series, and apply appropriate analytical techniques for solving first-order, higher-order, and non-homogeneous differential equations.				
Course Learning Outcomes	CLOs Statement		Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Demonstrate knowledge of differential equations by providing solutions using appropriate methods.		C-3	PLO-1 / SA-1
CLO-2	Solve differential equations using the Laplace transform technique and power series methods.		C-3	PLO-1 / SA-1
CLO-3	Apply the concepts of ordinary derivatives and partial derivatives for modeling of physical systems		C-3	PLO-2 / SA-2
Course Outline for Theory				
• Basic concept of differential equation, Solution of First order differential equation: Separable equation, Exact differential equation, integrating factor, and Linear ODEs. • Second and higher order Differential Equation: Homogenous linear ODE with constant coefficient, Cauchy Euler Equation, Non-homogenous Equation, undetermined coefficient, variation of parameter and/or similar methods, higher order differential equations. • Finding Laplace and inverse-Laplace of different functions, solution of differential equations using Laplace transform. • Basic concept of power series, radius of convergence, convergence interval, using power series method to find the solution of differential equation.				
Recommended Books				
1. "Advanced Engineering Mathematics" by Erwin Kreyszig, 10th Edition, Wiley, 2020. 2. "Elementary Differential Equations and Boundary Value Problems" by William E. Boyce and Richard C. DiPrima. 10th Edition. John Wiley & Sons. 2012.				

3. "Differential Equations with Boundary-Value Problems" by Dennis G. Zill and Michael R. Cullen, 10th Edition, Brooks, 2013.

(Course Code) and Title (EEI-411) Occupational Health and Safety		Credit Hours (1+0)	Pre-Requisite None		
Knowledge & Attitude Profile SK1(Social Sciences) SK5 (Engineering Design and Operations) SK7 (Knowledge)		Range of Problem Identification & Solving SP1 (Depth of Knowledge Required) SP2 (Range of Conflicting Requirements) SP6(Extent of Stakeholder involvement)		Range of Engineering Activities TA2 (Level of Interactions) TA4 (Consequences to society and the environment)	
Sustainable Development Goals (SDGs) SDG-4			Professional Competence Profile TC-1 (Comprehend & apply universal knowledge) TC-3 (Problem Analysis)		
Course Objectives					
After completion of this course, students will be able to understand the fundamental concepts of occupational health and safety, identify workplace hazards and unsafe practices in offices, industries, construction sites, and homes, and apply safe and healthy work practices for the prevention and control of occupational risks.					
Course Learning Outcomes	CLOs Statement			Taxonomy (Level)	Program Learning Outcomes (PLO)
CLO-1	After completion of this course students will be able to: Understand the importance of Occupational Health & Safety measures and its implication in a professional way.			C-2	PLO-6 / SA-6
CLO-2	Understand the policies and procedures to deal with the hazards and risks.			C-2	PLO-6 / SA-6
CLO-3	Demonstrate awareness of workplace hazards by identifying unsafe conditions and advocating appropriate mitigation and safety practices. .			A-3	PLO-9 / SA-9
Course Outline for Theory					
- Introducing Occupational Health and Safety and Pakistan Occupational Health & Safety Act. - Selected Topics in Health and Safety Management, Health and Safety Responsibility of Employers and Employees. - Risk Assessment, Process, Steps involve in Risk Assessment and Categorization of RA. - Workplace Hazards, Types and Protection, Fire Causes and Protection Methods, Electrical Hazards and Safety, Machine Hazards and Safety, Chemical Hazards and Safety. - First Aid Awareness, Accident Investigation, Types and Consequences of Accidents, promoting a Positive Health and Safety Healthy culture, Tools to Improve Health and Safety.					
Recommended Books					
"The Occupational Health, Safety and Environment Handbook for Professionals and Employees" by Rafe McKinnon, Routledge, 2021. "Fundamentals of Occupational Safety and Health" by Mark A. Friend and James P. Kohn, 8th Edition, Bernan Press, 2023. "Electrical Safety: A Guide to Causes and Prevention of Hazards" by J. M. Adams, Institution of Engineering and Technology (IET), 1994.					

8. Supervised Industrial Training

8.1. Background

Supervised Industrial Training (SIT) refers to students supervised hands-on experience in an environment where engineering technology is practiced, familiarizing them with professional engineering work prior to graduation. The training curriculum consists of minimum 16 weeks of continuous industrial training, comprised of 8 hours per day, 5 working days per week. A Bachelor of Engineering Technology student shall undergo mandatory SIT during the 8th semester (16 weeks), or 7th and 8th semesters (16 weeks mandatory and 16 weeks in 7th semester optional), after he/she has passed all subjects up to the 6th semester.

SIT covers a range of activities, such as design implementation, production processes, laboratory experiments, on-site field works and maintenance. It also serves as a mechanism to integrate engineering practices and the curriculum to achieve Program Learning Outcomes that cover Engineering Technologists Graduate Attributes in line with the Sydney Accord. While SIT provides practical exposure to engineering processes and helps developing professional skills required for an Engineering Technologist, it also offers an opportunity to the prospective employers to assess potential skills of a future employee.

8.2. Objectives

Through the SIT, students will:

- Learn to apply engineering technology knowledge learned in classroom environment in real industrial situations.
- Be provided exposure to professional practices in the industries.
- Understand the role and responsibilities and code of ethics that Engineering Technologists should uphold.
- Develop awareness about general workplace behavior and build interpersonal skills.
- Maintain professional work records and reports.

Learn to write reports and network with probable future employers to increase employability.

8.3. Responsibility of HEI: Placement in SIT Program

During the 7th (optional) and 8th semester, Bachelor of Electronics Engineering Technology students will undergo Mandatory continuous SIT of 16 (or 32) weeks. This training shall be arranged by HEIs in leading industries, and preferably should sign an MoU for the SIT. A designated Administrator/Coordinator of HEI shall complete all necessary documentation, preferably 12 weeks prior to the commencement of the training, and issue Training Schedule for 16 (or 32) weeks so that all stakeholders and the students are aware and assured of undergoing SIT training in 7th (optional) and 8th (mandatory) semester according to a scheduled timeline.

8.4. Responsibilities of Students

- Bachelor of Electronics Engineering Technology students shall get enrolled for SIT during the 6th semester and before commencement of 7th semester.
- Students shall have to undergo continuous training of 16 (or 32) credit hours. One week's training of 8 hours daily for 5 days (40 contact hours) will be counted as 1 credit hour. Accordingly, 16 weeks (One semester) will help earn students 16 credit hours.
- Total contact hours per semester are: 16 weeks per semester x 5 working days per week x 8 hours per day = 640. If an HEI opts SIT in 2 semesters (7th and 8th), these credit hours and contact hours will be doubled.
- Students will maintain a daily Logbook, signed by the SIT supervisor at site, Training Administrator appointed by HEI and the student.
- Students must observe safety & security rules of the Organization where they receive Training.
- Students must wear specified working dress during training.
- Students must obey all rules and regulations of the organization.
- Students must observe working timings of the training Organization. Students may be allowed 10 days leave

during Training period of 16 (or 32) for genuine reasons. The leave shall only be used to cater for emergencies, with prior sanction from the training Administrator/Coordinator.

- i. Leave will be deducted from training hours and required to be made up later.
- j. Unsanctioned leaves shall be treated as “absent”, and liable to disciplinary action.
- k. Public holidays and leave should not be counted as working hours.

8.5. Training Progress Assessment and Review by HEI

Every HEI should appoint a focal person as SIT Administrator/Coordinator for each program who will monitor progress randomly through site visits, phone calls or emails to the industrial organization’s counter-part focal person. Progress reports will be maintained after coordination with training supervisor(s) as well as the students.

The purpose of monitoring of SIT by Training Administrator/Coordinator are:

- a. To ensure the training organization is providing suitable and appropriate training to students.
- b. To obtain feedback on students’ performance and training progress through discussion with training supervisor(s).
- c. To make courtesy visits and establish industrial relations between the HEI and the industries where students will receive their SIT.
- d. To discuss the possibility of students’ job placement with the training organization.
- e. To survey new industries as potential training placement locations in the future.

8.6. Changing Student Placement During SIT

Students are discouraged to change placement during the training period from one organization to another.

- a. However, written permission may be granted by the training Administrator/Coordinator, if new placement of the student is available and confirmed in another organization, provided the student does not suffer loss of training hours due to this changeover.
- b. After getting written permission from the Training Administrator/Coordinator, a fresh approval should be applied for the new placement.

8.7. Daily Training Logbook

All training activities must be recorded on daily basis in the Training Logbook [See Appendix F]. Students must get it signed, on daily basis, by on-the-job Trainer.

The Training logbook must reflect:

- a. The student’s learning experience during the industrial training
- b. Training records and evidence of supervised training, with evidence of participation of student, on- the-job Trainer and HEI’s training Administrator/Coordinator.
- c. Part of professional practice in engineering profession where incidence and evidence are properly documented.
- d. Information that becomes a source of reference in preparing the Industrial Training Report.
- e. The Logbook must be submitted along with the Industrial Training Report.

8.8. Industrial Training Report

An Industrial Training Report will be submitted upon completion of SIT. The Report must describe student’s learning and development in technical knowledge, engineering practices and professional skills acquired through practical experience. The Industrial Training Report should also reflect student’s ability in communication skills and understanding of engineering practices. Students should seek advice from their on-the-job Trainer at site, to ensure that no confidential materials are included in the report. The report shall be submitted to the Training Administrator. The student may present a copy of the report to the prospective employer. Any references made in preparation of the report should be recognized using standard referencing formats. Students should refer to the Industrial Training Report Template as

provided [See Appendix G] and guidelines given below in preparing the Report. The Daily Training Logbook should be submitted together with the Report.

8.9. Guidelines for Preparation of Industrial Training Report

Under the guidance of supervisors, students need to properly document their experience and learning during the SIT in form of an Industrial Training Report. A properly prepared Report can portray their practical experience precisely in an orderly manner. The Report must be prepared according to the format and the guidelines below:

8.9.1. Contents of Industrial Training Report

(a) Table of Contents

This section of the report shall consist of:

- i. Headings
- ii. Sub-headings
- iii. Page numbers

Every appendix requires a title, and each page needs to be numbered accordingly.

(b) Background & Profile of the Training Organization

Brief and concise description of the organization in which the student is undertaking the SIT. The main items are:

- i. Backgrounds/profile of the organization
- ii. Vision and Mission
- iii. Organogram.
- iv. Title and position of the supervisor in charge
- v. Other necessary information only (not more than three pages)

(c) Schedule of Duties Performed as Trainee

This section briefly describes the time, duration and types of duties performed during the training. The description must follow the schedule of the training, i.e., in chronological order (for 16/32 weeks). The days when the student was not on duty must be properly recorded with cogent reasons.

(d) Experience During SIT

In this section, the student must describe fully the industrial training experience gained. Some suggested areas include:

- i. Project (s) carried out, if any.
- ii. Supervisory works
- iii. Problems encountered
- iv. Problems solving process or approach
- v. Hands-on skills acquired.
- vi. How productivity can be further enhanced.
- vii. Quality Management system in place.
- viii. Safety at work.

(e) Conclusion

Students provide an overall assessment in this section and arrive at a conclusion with regards to the SIT undergone. Content may include:

- i. Major works performed during SIT
- ii. Different modules of SIT
- iii. Comments whether SIT met the training objectives
- iv. Suggestions and recommendations for improvement of the SIT

(f) References

A complete list of the references used in the report must be included according to standard referencing format.

(g) Appendixes

Appendixes are additional information appended to support the main text of the Report. A copy of the letter of permission from the Training Organization must be attached as an appendix. Other suggested appendixes are:

- i. Investigation and project report during SIT
- ii. Technical drawings, so far these are not secret documents or proprietary etc.
- iii. Any other document that adds to the Report

(h) Figures and Tables

All figures, tables and similar content must be captioned, labeled, and mentioned in the main text of the Report.

(i) Notations, Symbols & Acronyms

If the report contains notations, symbols, and acronyms, these must be defined before they first appear in the main text. It is good practice to put list of notations, symbols, and acronyms on a separate page, appropriately titled, and placed after 'Tables of Contents' page.

Every appendix must have a title and be mentioned in the main text of the Report. All page numbers for appendixes must be in continuation of page numbers of the main Report.

8.9.2. Format of the Report

(a) General

- i. Students are advised to start writing the SIT Report as soon as training commences to ensure a timely completion and submission.
- ii. Do not include irrelevant materials, e.g., brochures from the organizations, or any publicity materials in the report.
- iii. The Report must be typewritten on plain white A4 size paper, with 12-point Times New Roman font type and line spacing of 1.5.

(b) Abstract or Preface

The Report should start with an abstract of maximum 2 pages, and should briefly describe:

- i. Description of Organization providing SIT
- ii. Summary of the Report
- iii. Acknowledgements

8.10. SIT Assessment

Assessment of the SIT should be based on the following parameters:

- | | |
|---|-------------|
| i. On-the-Job Trainer Report | (20% marks) |
| ii. HEI's Training /Advisor Report through visits or survey | (10% marks) |



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- | | | |
|------|----------------------------|-------------|
| iii. | Industrial Training Report | (50% marks) |
| iv. | Viva voce | (20% marks) |

Please note that:

- i. Minimum 50% marks are required to pass the SIT.
- ii. Students must be diligent in writing their Report.
- iii. The Report must be of good quality and portray in full the industrial experience and knowledge gained.
- iv. The Report should not be in the form of short notes and figurative form.
- v. If the Report is not satisfactory, students shall rewrite the Report until it is deemed satisfactory.

8.11. Completion of Industrial Training

- i. Upon completion of a 16 or 32-week continuous SIT, a Confirmation Letter to this effect must be obtained from the training organization and/or probable employer.
- ii. The Confirmation Letter must be submitted to the Industrial Training Administrator/Coordinator, together with the (1) On-the-Job Trainer's Report, (2) Student Feedback Form, and (3) Industrial Training Report for grading.

APPENDIX A: Sydney Accord Knowledge and Attitude Profile

(Retrieved from www.ieagrements.org)

A Sydney Accord program provides:
SK1: (Natural and Social Sciences) A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences.
SK2: (Mathematics) Conceptually based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline.
SK3: (Engineering Fundamentals) A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline.
SK4: (Specialist Knowledge) Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline.
SK5: (Engineering Design and Operations) Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations using the technologies of a practice area.
SK6: (Engineering Technologies) Knowledge of engineering technologies applicable in the sub-discipline.
SK7: (Role of Engineering in Society) Knowledge of the role of technology in society and identified issues in applying engineering technology, such as public safety and sustainable development (represented by the 17 UN-SDGs).
SK8: (Technological Literature) Engagement with the current technological literature of the discipline and awareness of the power of critical thinking.
SK9: (Ethics and Conduct) Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

APPENDIX B: Engineering Technologist Graduate Attribute Profile

(Retrieved from www.ieagrements.org)

As per Sydney Accord, Engineering Technologist Graduate is expected to have the following attributes:
Engineering Technology Knowledge: SA1: Apply knowledge of mathematics, natural science, computing and engineering fundamentals and an engineering specialization as specified in SK1 to SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies.
Problem Analysis: SA2: Identify, formulate, research literature and analyze broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialization. (SK1 to SK4)
Design/Development of Solutions: SA3: Design solutions for broadly- defined engineering technology problems and contribute to the design of systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required (SK5).
Investigation: SA4: Conduct investigations of broadly defined engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions (SK8).
Tool Usage: SA5: Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems (SK2 and SK6).
The Engineering Technologist and World: SA6: When solving broadly-defined engineering problems, analyze and evaluate sustainable development impacts* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (SK1, SK5, and SK7).
Ethics: SA7: Understand and commit to professional ethics and norms of engineering technology practice including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (SK9).
Individual and Collaborative Teamwork: SA8: Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (SK9).
Communication: SA9: Communicate effectively and inclusively on broadly-defined 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, taking into account cultural, language, and learning differences.
Project Management and Finance: SA10: Apply knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a team and to manage projects in multidisciplinary environments.
Lifelong Learning: SA11: Recognize the need for, and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of new specialist technologies (SK8).

APPENDIX C: Engineering Technologist Professional Competence Profile

(Retrieved from www.ieagrements.org)

As per Sydney Accord, Engineering Technologist Graduate is expected to demonstrate the following competencies:
Comprehend and apply universal knowledge: TC1: Comprehend and apply the knowledge embodied in widely accepted and applied procedures, processes, systems, or methodologies.
Comprehend and apply local knowledge: TC2: Comprehend and apply the knowledge embodied procedures, processes, systems, or methodologies that is specific to the jurisdiction of practice.
Problem analysis: TC3: Identify, clarify, and analyze broadly defined problems using the support of computing and information technologies where applicable.
Design and development of solutions: TC4: Design or develop solutions to broadly defined problems considering a variety of perspectives.
Evaluation: TC5: Evaluate the outcomes and impacts of broadly defined activities.
Protection of society: TC6: Recognize the foreseeable economic, social, and environmental effects of broadly defined activities and seek to achieve sustainable outcomes (represented by the 17 UN-SDGs).
Legal, regulatory, and cultural: TC7: Meet all legal, regulatory, and cultural requirements and protect public health and safety during all activities.
Ethics: TC8: Conduct activities ethically
Manage engineering activities: TC9: Manage part or all of one or more broadly defined activities.
Communication and Collaboration: TC-10: Communicate and collaborate using multiple media clearly and inclusively with a broad range of stakeholders during all activities.
Continuing Professional Development (CPD) and Lifelong learning: TC11: Undertake CPD activities to maintain and extend competences and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.
Judgement: TC12: Choose appropriate technologies to deal with broadly defined problems. Exercise sound judgement in the course of all broadly defined activities.
Responsibility for decisions: TC13: Be responsible for making decisions on part or all of one or more broadly defined activities.

APPENDIX D: Minutes of the Preliminary Meeting of the National Curriculum Review Committee (NCRC) for BS Electronics Engineering Technology

Venue: National University of Technology (NUTECH), Islamabad

Dates: May 4–6, 2026

Organized by: National Technology Council (NTC) in collaboration with Higher Education Commission (HEC), Pakistan, and GIZ Germany

Day 1 Proceedings

Opening Session

The preliminary meeting of the National Curriculum Review Committee (NCRC) for the BS Electronics Engineering Technology program commenced at NUTECH, Islamabad. Prof. Dr. Wasim Khaliq welcomed the participants and highlighted the objectives and significance of the meeting in the context of outcome-based education and international accreditation requirements.

Following the introductions, the following office bearers were announced for the proceedings:

- **Convener:** Prof. Dr. Muhammad Amir, Dean FET, International Islamic University (IIU), Islamabad
- **Co-Convener:** Prof. Dr. Adeel Akram, Vice Chancellor, Punjab Tianjin University of Technology (PTUT), Lahore
- **Secretary:** Dr. Muhammad Ayub Tareen, Associate Professor, BUIITEMS, Quetta

The Convener, Prof. Dr. Muhammad Amir, in consultation with the Committee Members, assigned the development and review of knowledge-area-specific courses to the respective sub-committees, taking into consideration the members' relevant academic background, professional experience, and subject-matter expertise. Accordingly, five sub-committees were constituted to review, develop, and finalize the course profiles within their respective knowledge areas.

1. Electronics Engineering Technology General Education		
S. No.	Name	Role
1	Engr. Prof. Dr. Madad Ali Shah	Convener
2	Prof. Dr. Jameel Ahmed	Member
3	Prof. Dr. Muhammad Ali Qureshi	Member
4	Prof. Dr. Muhammad Ghazanfarullah Khan	Member
2. Electronics Engineering Technology Interdisciplinary Subjects		
S. No.	Name	Role
1	Dr. Abdullah Waqas	Convener
2	Prof. Dr. Hafiz Ashiq Hussain	Member
3	Dr. Asad Saleem	Member
3. Subcommittee: Electronics Engineering Technology Foundation		
S. No.	Name	Role
1	Dr. Raees Ahmed Siddique	Convener
2	Dr. Madiha Arshad	Member
3	Dr. Syed Basit Ali Bukhari	Member
4. Subcommittee: Electronics Engineering Technology Breadth		
S. No.	Name	Role

1	Prof. Dr. Muhammad Nasir Khan	Convener
2	Dr. Engr. Haider Ali	Member
3	Mr. Usman Habib	Member
5. Subcommittee: Electronics Engineering Technology Depth		
S. No.	Name	Role
1	Prof. Dr. Yaseer Arafat Durrani	Convener
2	Dr. Seroosh Karim Noon	Member
3	Mr. Muhammad Kamran Bhatti	Member
4	Mr. Usman Habib	Member

Technical Proceedings

1. Mr. Hidayatullah Kasi, Deputy Director, Academics Division, HEC Islamabad, delivered a presentation on curriculum development guidelines and the HEC curriculum template.
2. Five expert subgroups were formed for General Education, Foundation, Breadth, Depth, and Interdisciplinary Subjects (IDS) domains.
3. The Secretary populated the HEC curriculum template with the proposed Electronics Engineering Technology courses categorized according to their domains.
4. The Convener shared the framework of Graduate Attributes, Professional Competencies, and UN Sustainable Development Goals (SDGs) aligned with international engineering technology standards.
5. A standardized course profile template was developed incorporating Knowledge Profiles (SKs), Technologist Competencies (TCs), CLOs, Bloom's Taxonomy levels, course contents, recommended books, and PLO mappings.
6. Courses were distributed among the subgroups for development of detailed course profiles.
7. At the end of the day, the Secretary presented the progress achieved and outlined the tasks for Day 2.

Day 2 Proceedings

1. All subgroups continued working on their assigned domains and developed detailed theory and laboratory course profiles.
2. The Convener guided the members regarding effective mapping of Knowledge Profiles (SKs), Technologist Competencies (TCs), and UN Sustainable Development Goals (SDGs).
3. The developed course profiles were presented before the NCRC forum for review and refinement.
4. The committee discussed and finalized recommendations regarding elective courses, subject nomenclature, and domain-wise distribution.
5. The Secretary presented a summary of the work completed during Day 2.

Day 3 Proceedings

8. The Secretary presented a consolidated summary of the work completed by all subgroups.
9. Peer review of the developed course profiles was conducted to ensure consistency and alignment with outcome-based education principles.
10. Participants visited laboratories, innovation facilities, and the National Incubation Center (NIC) at NUTECH.

Closing Session and Contributions by Members

- **Prof. Dr. Wasim Khaliq (NUTECH, Islamabad):** Presented the major outcomes of the preliminary meeting and emphasized alignment with international accreditation requirements and Sydney Accord considerations.
- **Prof. Dr. Muhammad Amir (Dean FET, IIU Islamabad):** Presented the summary of proceedings and informed members regarding follow-up online meetings and international vetting of the curriculum.

- **Prof. Dr. Jameel Ahmed (Vice Chancellor, MY University Islamabad):** Appreciated the collaborative contributions and expert input of the committee members.
- **Engr. Prof. Dr. Madad Ali Shah (Vice Chancellor, Shaheed Benazir Bhutto University (SBBU), Nawabshah):** Highlighted curriculum alignment with SDGs and emphasized the importance of technologists for Pakistan's development.
- **Mr. Hidayatullah Kasi (Deputy Director, HEC Islamabad):** Observed that the curriculum is aligned with the HEC undergraduate framework and stressed the importance of industry involvement in supervised industrial training.
- **Prof. Dr. Muhammad Ghazanfar Ullah Khan (HoD, UIT University Karachi):** Suggested that NTC should devise mechanisms to facilitate and regulate industrial training opportunities.
- **Mr. Usman Habib (Chief Technology Officer (CTO), Indus Electric Lahore):** Discussed apprenticeships, supervised industrial training, paid internships, and the need for PhD programs in technology disciplines.
- **Dr. Muhammad Ayub Tareen (HoD, BUIITEMS Quetta):** Recommended greater inclusion of industry experts in curriculum development and emphasized faculty development in modern pedagogical and andragogical methodologies.
- **Mr. Muhammad Kamran Bhatti (Project Director, National Institute of Technology Islamabad):** Highlighted the rapid growth of the chip design industry and IC design training initiatives in Pakistan.
- **Dr. Asad Saleem (Associate Professor, Shanghai University of Medicine & Health Sciences, China):** Recommended enhanced industry placement, practical project-based learning, and inclusion of foreign language courses for global employability.
- **Mr. Aijaz Qureshi (GIZ Pakistan):** Noted the vertical alignment of the curriculum with competency-based Level-5 DAE qualifications.
- **Prof. Dr. Yaseer Durrani (Chairperson, UET Taxila):** Highlighted the need for laboratory development support for HEIs lacking advanced infrastructure.

Remarks by Lt. Gen. Moazzam Ejaz, HI (M) (Retd.), Chairman NTC

- Strengthening industry-academia linkages through NTC (centralized) and institutional platforms (decentralized). Decentralized approach is prevailing the today's world.
- Expansion of teacher training and professional development initiatives in next phase.
- Encouragement for HEIs to establish stronger industrial collaborations for internships and supervised industrial training.
- Promotion of job fairs and technologist databases to improve graduate employability.
- HEC supports launching MS and PhD programs in Engineering Technology disciplines.
- Encouragement for HEIs to offer international language courses to improve global employability.
- HEC's facilitation of funding support for laboratories in the HEIs with technology education infrastructure.
- Continuation of efforts toward international recognition and Sydney Accord alignment.

Conclusion

The meeting concluded with a vote of thanks by the Chairman NTC, Lt. Gen. Moazzam Ejaz, HI (M) (Retd.), who appreciated the active participation and valuable contributions of all members. Commemorative shields were distributed among the participants in recognition of their contributions.

APPENDIX E: Minutes of the Final Meeting of the National Curriculum Review Committee (NCRC) for BS Electronics Engineering Technology

Venue: National University of Technology (NUTECH), Islamabad

Dates: July 20- 22, 2026, 2026

Organized by: National Technology Council (NTC) in collaboration with Higher Education Commission (HEC), Pakistan, and GIZ Germany

Day 1 Proceedings

Opening Session

The Final Meeting of the National Curriculum Review Committee (NCRC) for the BS Electronics Engineering Technology program commenced at NUTECH, Islamabad. The meeting was attended by representatives from academia, industry, regulatory bodies, and international experts. The Convener welcomed the participants and emphasized the importance of finalizing a contemporary curriculum aligned with Outcome-Based Education (OBE), graduate competencies, Industry Revolution 5.0 requirements, international accreditation practices, and the future needs of Pakistan's technology sector. The following office bearers continued their responsibilities during the final meeting:

- **Convener:** Prof. Dr. Muhammad Amir, Dean, Faculty of Engineering and Technology, International Islamic University (IIU), Islamabad
- **Co-Convener:** Prof. Dr. Adeel Akram, Vice Chancellor, Punjab Tianjin University of Technology (PTUT), Lahore
- **Secretary:** Dr. Muhammad Ayub Tareen, Associate Professor, BUITEMS, Quetta

Technical Proceedings

1. The Convener briefed the participants regarding the work completed during the preliminary meeting and two online meetings deliberations.
2. The committee reviewed the draft curriculum document prepared after incorporating the recommendations received during the preliminary and online meetings.
3. The General Education Sub-Committee was assigned the task of preparing sample guidelines for Vision and Mission Statements for the BS Electronics Engineering Technology program.
4. The Foundation Sub-Committee was assigned the task of developing the Preface of the NCRC curriculum document.
5. The Breadth Sub-Committee was tasked with preparing the Preamble of the NCRC document.
6. The Depth Sub-Committee was assigned the responsibility of developing the Rationale and Scope section of the BS Electronics Engineering Technology curriculum document.
7. The Interdisciplinary Subjects (IDS) Sub-Committee was tasked with identifying and proposing courses leading toward professional certifications in accordance with HEC guidelines and international best practices.
8. Throughout the day, all sub-committees worked on their assigned tasks and coordinated continuously with the Secretary to ensure consistency in formatting and alignment with NTC and HEC requirements.
9. Following the lunch session, all sub-committees submitted their completed assignments to the Secretary.
10. The Secretary incorporated the updates into the master curriculum document and presented the completed work before the committee for review and feedback.
11. The committee discussed the developed sections and provided recommendations for minor refinements and improvements

Day 2 Proceedings

1. The General Education Sub-Committee was tasked with preparing a complete sample of a Broadly Defined Problem (BDP) encompassing:
 - Problem Statement
 - Objectives
 - Scope
 - Methodology
 - Expected Outcomes
 - Assessment Criteria

- Evaluation Rubrics

1. The Foundation Sub-Committee was assigned the task of preparing an additional comprehensive example of a BDP incorporating all prescribed attributes.
2. The Breadth Sub-Committee was tasked with revising the contents and Course Learning Outcomes (CLOs) of two courses by incorporating concepts and competencies associated with Industry Revolution 5.0, including human-centric innovation, sustainability, resilience, digital transformation, and industrial automation.
3. The Depth Sub-Committee was assigned the development of another complete BDP example to facilitate implementation across engineering technology programs.
4. The Interdisciplinary Subjects (IDS) Sub-Committee was tasked with developing a comprehensive Standard Operating Procedure (SOP) for Broadly Defined Problems, covering the complete process from conceptualization and definition to implementation, assessment, evaluation, and continuous improvement.
5. The Convener and senior members provided guidance to the sub-committees regarding the implementation of BDPs and alignment with graduate competencies, program learning outcomes, and accreditation requirements.
6. All sub-committees remained actively engaged throughout the day and completed their respective assignments.

The Secretary coordinated with all groups and ensured uniform documentation and integration of developed material into the draft curriculum

Day 3 Proceedings

1. All sub-committees submitted their completed Day 2 assignments to the Secretary.
2. The Secretary incorporated all updates, revisions, examples, SOPs, and recommendations into the final NCRC curriculum document.
3. The revised document was presented before the committee for final review and approval.
4. The committee reviewed the additions relating to Broadly Defined Problems (BDPs), Industry Revolution 5.0 competencies, professional certification pathways, curriculum philosophy, and implementation guidelines.
5. Members appreciated the comprehensive nature of the revised curriculum and acknowledged the collaborative efforts of all sub-committees.

The committee unanimously endorsed the final draft of the BS Electronics Engineering Technology curriculum document subject to final formatting, proofreading, and editorial review

Closing Session and Contributions by Members

Convener, Dean Faculty of Engineering and Technology, International Islamic University (IIU), Islamabad

- Presented the salient features of the finalized NCRC document.
- Highlighted major improvements incorporated during the final meeting.
- Briefed the Chairman NTC and committee members regarding the new additions in the curriculum, particularly the inclusion of BDP frameworks, Industry Revolution 5.0 concepts, professional certifications, and continuous quality improvement mechanisms.
- Appreciated the dedication and collaborative efforts of all committee members.

Prof. Dr. Adeel Akram

Co-Convener and Vice Chancellor, Punjab Tianjin University of Technology (PTUT), Lahore

- Appreciated the collective efforts of the committee.
- Emphasized the significance of maintaining curriculum relevance with emerging technological trends and industrial requirements.

Dr. Muhammad Ayub Tareen

Secretary, Associate Professor, BUIEMS, Quetta

- Presented a consolidated summary of the tasks completed during the three-day meeting.
- Briefed the participants regarding the incorporation of all recommendations and updates into the final curriculum document.
- Acknowledged the contributions of all sub-committees and participants.

Hafiz Ghulam Muhammad Musa

Deputy Director, National Technology Council (NTC), Islamabad

- Explained the future roadmap for implementation of the curriculum.
- Briefed the participants regarding the actions and follow-up activities proposed by NTC.
- Discussed procedures for dissemination and adoption of the curriculum by Higher Education Institutions.

Engr. Prof. Dr. Madad Ali Shah

Vice Chancellor, Shaheed Benazir Bhutto University (SBBU), Nawabshah

- Appreciated the efforts of NTC for refining and strengthening the curriculum document.
- Recommended that NTC should develop a comprehensive marketing and awareness strategy for Engineering Technology programs throughout Pakistan.
- Emphasized the importance of promoting engineering technology education among prospective students, industry, and policymakers.

Remarks by Chairman NTC

Lt. Gen. Moazzam Ejaz, HI (M) (Retd.)

Chairman, National Technology Council (NTC), Pakistan

The Chairman NTC attended the closing ceremony in person and appreciated the exceptional work carried out by the NCRC Electronics Engineering Technology committee.

He highlighted the following recommendations and future directions:

- A dedicated committee should be established for formatting, editing, and proofreading the final curriculum document.
- The curriculum should undergo review and vetting by internationally recognized Pakistani professionals and academicians working in leading universities and industries across the world.
- Independent third-party evaluation of the curriculum should be conducted to ensure quality, relevance, and international compatibility.
- Continuous engagement with industry stakeholders should be maintained to keep the curriculum responsive to technological advancements and workforce requirements.
- Higher Education Institutions should be encouraged to adopt innovative teaching methodologies, project-based learning, and industry-integrated practices.
- NTC should continue its efforts toward strengthening national and international recognition of Engineering Technology programs.

The Chairman congratulated all members on successfully completing the curriculum revision process and acknowledged their valuable contributions toward strengthening engineering technology education in Pakistan.

Conclusion

The Final NCRC Meeting for BS Electronics Engineering Technology successfully concluded after three days of intensive deliberations, reviews, and collaborative development activities. The committee finalized critical components of the curriculum document, including the Vision and Mission guidelines, Preface, Preamble, Rationale and Scope, professional certification pathways, Broadly Defined Problem (BDP) frameworks, Industry Revolution 5.0 integrations, and the SOP for BDP implementation. The Chairman NTC appreciated the dedication and professionalism of all members and expressed confidence that the revised curriculum would significantly contribute to the advancement of Engineering Technology education and graduate employability in Pakistan. The meeting concluded with a vote of thanks to all participants for their valuable contributions and commitment toward strengthening the national engineering technology education framework.



APPENDIX F: Supervised Industrial Training Logbook (Sample Format)

Personal Details:

Name:

Roll Number:

Address:

Email:

Course of Study:

Year/Semester of Study:

Training Start Date:

Training End Date:

Training Organization Details:

Name of Organization:

Address:

Contact Person:

Contact Number:

On-the-job Trainer Name:

On-the-job Trainer Contact Number:

Daily Training Log

Please specify training information by descriptive statements, tables, sketches, figures, photographs, and so forth. Feel free to incorporate attachments wherever necessary.

Training Week: _____

Date	Time	Training Log

Declaration:

I, _____ Roll Number _____, do hereby declare that all information provided above is true and correct to the best of my knowledge.

Student signature with date

Organization Supervisor signature with date

HEI Coordinator signature & date

APPENDIX G: Supervised Industrial Training Report (Sample Format)

Sample table of content for supervised industrial training report is provided so that students can develop an understanding of what is expected of them when making the submission. Students are encouraged to expand upon the content presented below. A declaration page validating the originality of work duly signed by the student and the trainee is also to be attached at the beginning of the submitted report.

Chapter 1	Background of Training Organization	XX
Chapter 2	Schedule of Training and Duties as Trainee	XX
	2.1 Sub-heading	XX
	2.2 Sub-heading	XX
	2.3 Sub-heading	XX
	...	
Chapter 3	Working Experience	XX
	3.1 Projects carried out (as assigned by the on-the-job trainer)	XX
	3.2 Hands-on skills acquired	XX
	3.3 Problems and challenges encountered	XX
	3.4 Problem solving process	XX
	3.5 Supervisory tasks	XX
	3.6 Suggestions for enhancing productivity	XX
	3.7 Quality management systems in place	XX
	3.8 Safety features at workplace	XX
	3.9 Additional sub-headings	XX
	3.10...	XX
Chapter 4	Conclusion	XX
	References	XX
	Appendices	XX

APPENDIX H: Inclusion of Professional Certifications

To align the Bachelor Sciences in Electronic Engineering Technology curriculum with HEC policy and current industry practices, the National Curriculum Review Committee (NCRC) recommends that Higher Education Institutions (HEIs) facilitate opportunities for students to obtain national/international recognized professional certifications in relevant areas such as electronics, embedded systems, PCB design, industrial automation, instrumentation, networking, Internet of Things (IoT), programming, power systems, renewable energy, engineering safety, and project management. Universities may recognize such certifications for 1–6 credit hours, subject to the HEC guidelines, CLO mapping, certification workload, verification of authenticity, and approval by the relevant statutory bodies. Universities may recognize certifications from internationally or nationally accredited organizations. Equivalent certifications from other recognized bodies may also be accepted subject to HEI policy. A priority list of professional certifications is provided below as a guideline. HEIs may add, replace, or remove certifications according to their academic needs, industry requirements, and available resources, subject to compliance with the HEC policy on professional certifications and approval by the relevant statutory bodies of the university.

- a. PCEP – Python Institute
- b. STM32 Certified Developer – STMicroelectronics
- c. ARM Accredited Engineer – Arm Ltd.
- d. Altium Designer Certification – Altium Ltd.
- e. Siemens TIA Portal Programmer – Siemens Digital Industries
- f. Certified LabVIEW Associate Developer (CLAD) -- National Instruments
- g. ETAP Certified Engineer – ETAP
- h. Cisco CCNA – Cisco Systems
- i. IOSH Managing Safely or NEBOSH IGC – IGC IOSH / NEBOSH
- j. CAPM – Project Management Institute (PMI)
- k. Siemens TIA Portal Programmer – Siemens
- l. ETAP Certified Engineer – ETAP
- m. AWS IoT, Azure IoT – Amazon, Microsoft
- n. PV Installation Professional – NABCEP (or equivalent national body)
- o. Google Data Analytics Professional Certificate – Google
- p. Intel FPGA Fundamentals – Intel
- q. AMD (Xilinx) FPGA Certification – AMD Xilinx

APPENDIX I: SoP for Broadly Defined Problems

1. Purpose

The purpose of this Standard Operating Procedure (SoP) is to provide a uniform framework for the implementation, evaluation, documentation, and continuous quality improvement of Broadly Defined Problems (BDPs) in BS Electronics Engineering Technology program. The SoP aims to ensure that all BDP activities contribute effectively to the attainment of GA defined for electronics engineering technology program.

2. Definitions

(a) Broadly Defined Problems

A BDP is an engineering technology problem that requires the application of established engineering technology principles, practical knowledge, analytical techniques, and modern engineering tools to develop one or more feasible solutions. Such problems involve multiple technical and non-technical considerations, may include conflicting stakeholder requirements, and require engineering judgment within the framework of applicable standards, codes, and professional practices. Although the problems are generally familiar in nature, they are sufficiently complex to require analysis, evaluation of alternatives, integration of knowledge from multiple domains, and consideration of economic, environmental, societal, ethical, and sustainability factors.

According to the International Engineering Alliance (IEA 2021), Broadly defined Engineering Problems have a range of characteristics given in Table 1. The BDP must have SP1 and some or all of SP2 to SP7.

Table 1: Characteristics of BDP

Attribute	Description
Depth of Knowledge Required	SP1: Cannot be resolved without engineering knowledge at the level of one or more of SK4, SK5, and SK6 supported by SK3 with strong emphasis on the application of development technology
Range of Conflicting Requirements	SP2: Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of Analysis Required	SP3: Can be solved by application of well-proven analysis techniques and models
Familiarity of Issues	SP4: Belong to families of familiar problems which are solved in well-accepted ways
Extent of Applicable Codes	SP5: Address problems that may be partially outside those encompassed by standards or code of practice
Extent of Stakeholder Involvement and Conflicting Requirements	SP6: Involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs
Interdependence	SP7: Address components of systems within complex engineering problems

(b) Broadly Defined Activities

Broadly Defined Activities (BDAs) are professional engineering technology activities undertaken to analyze, design, and manage engineering systems and processes. These activities require the application of established engineering technology knowledge, practical skills, modern engineering tools, and professional judgment while considering technical, economic, environmental, societal, ethical, health and safety, and sustainability requirements. Such activities are generally performed within established engineering technology practices and standards but may require adaptation to suit specific applications and stakeholder needs.

According to the International Engineering Alliance (IEA 2021), Broadly-defined Engineering Activities have a range of characteristics given in Table 2.

Table 2: Characteristics of BDA

Attribute	Description
Range of Resources	TA1: Involve a variety of resources including people, data and information,

	natural, financial and physical resources and appropriate technologies including analytical and/or design software.
Level of Interactions	TA2: Require the best possible resolution of occasional interactions between technical, non-technical, and engineering issues, of which few are conflicting
Innovation	TA3: Involve the use of new materials, techniques or processes in non-standard ways
Consequences to Society and the Environment	TA4: Have reasonably predictable consequences that are most important locally, but may extend more widely
Familiarity	TA5: Require a knowledge of normal Operating procedures and processes.

3. 3. Implementation Procedure

(a) Selection of Courses

Each Engineering Technology department shall identify the courses within its curriculum that are suitable for the implementation of BDPs. The selection of courses shall ensure the systematic development of graduate attributes by providing students with progressive opportunities to solve practical engineering technology problems throughout the program. The selected courses shall be approved through the department's academic quality assurance mechanism and incorporated into the curriculum implementation plan.

(b) Criteria for Selection of Courses

A course may be selected for implementation of BDPs if it satisfies the following criteria:

- The course includes practical, laboratory, design, project, fieldwork, or application-oriented components.
- The Course Learning Outcomes (CLOs) requires students to apply engineering technology knowledge and practical skills to solve engineering technology problems.
- The course provides opportunities for students to exercise engineering technology judgment and decision-making.
- The course enables assessment of one or more Program Learning Outcomes (PLOs) related to engineering technology design, analysis, and/or problem solving.
- The allocated contact hours and available resources are sufficient for planning, implementation, and assessment of the BDP.
- The course level is appropriate for the expected complexity of the engineering technology problem.

(c) Distribution across the Curriculum

The department should ensure that BDPs are distributed appropriately across the curriculum to facilitate the progressive development of students' competencies. Normally, BDPs should be incorporated into application-oriented courses beginning from the intermediate semesters and culminating in senior-level design courses. The number and complexity of BDPs should increase progressively as students advance through the program.

4. Instructor's Responsibilities

After the department has identified the courses for the implementation of BDPs, the respective course instructor shall develop one or more BDP(s) aligned with the CLOs, PLOs/GAs prescribed for engineering technology. The planning and development process shall ensure that the selected problem is appropriate for the level of the course and provides sufficient opportunities for students to demonstrate engineering technology competencies. Each BDP shall be mapped to:

- Relevant Course Learning Outcomes (CLOs);
- Relevant Program Learning Outcomes (PLOs);
- Graduate Attributes for Engineering Technologists; and

Characteristics of Broadly Defined Engineering Technology Problems (SP1–SP7), where applicable.

(a) Development of the Problem Statement

The course instructor shall prepare a comprehensive problem statement that clearly defines the engineering technology problem to be addressed. The problem statement should include, where applicable:

- Background and context of the problem.
- Problem description and objectives.
- Scope of work and expected outcomes.
- Technical specifications and design requirements.
- Assumptions and constraints.
- Applicable engineering standards, codes, and regulations.
- Available resources, laboratory facilities, software, and equipment.
- Expected deliverables.
- Project schedule and milestones.

The problem statement should encourage students to investigate alternative approaches and develop one or more technically acceptable solutions using established engineering technology principles.

(b) Planning of Engineering Technology Activities

The instructor shall identify the engineering technology activities required for successful completion of the BDP. Depending on the nature of the course, these activities may include:

- Problem identification and analysis;
- Engineering calculations;
- Design and development;
- Computer modelling and simulation;
- Laboratory experimentation;
- Fabrication or implementation;
- Testing and validation;
- Troubleshooting and optimization;
- Technical documentation; and
- Oral presentation and demonstration.

The selected activities should collectively address the characteristics of BDAs (TA1–TA5).

(c) Assessment Planning

The instructor shall prepare an assessment plan before assigning the BDP to students. The assessment plan shall specify:

- Assessment components;
- Evaluation criteria;
- Assessment rubrics;
- Weightage of each assessment component;
- Individual and/or group assessment strategy;
- Submission schedule; and
- Feedback mechanism.

The assessment shall evaluate both the engineering solution and the student's application of engineering technology knowledge, practical skills, professional judgment, communication skills, teamwork (where applicable), and ethical practices.

5. Documentation

These records shall be maintained as evidence for internal quality assurance and accreditation purposes as shown in Table 3.

Table 3: Checklist for documentation

S. No.	Item	Status
--------	------	--------

1	Problem statement prepared	☐
2	CLOs and PLOs mapped	☐
3	Graduate Attributes identified	☐
4	SP characteristics considered	☐
5	Engineering Technology Activities identified	☐
6	Assessment rubrics prepared	☐
7	Timeline finalized	☐
8	Safety and ethical issues addressed	☐
9	Departmental approval obtained	☐

6. Approval of BDPs

Each proposed BDP shall be reviewed and approved through the department's academic quality assurance mechanism (e.g., Program Committee, Departmental Board of Studies, or OBE Committee, as applicable) before its implementation. The approval process shall ensure that the selected problem:

- satisfies the requirements of this SOP;
- supports the intended learning outcomes;
- is appropriate for the level of the course; and
- provides adequate opportunities for students to demonstrate the graduate attributes expected of engineering technologists.

APPENDIX J: Two (02) Sample Broadly Defined Problems

Sample – I (Broadly Defined Problem)

Course: Electronic Devices and Circuits

Title: Smart Solar-Powered Battery Charging System for Rural Applications

1. Problem Statement

Many rural areas experience frequent power outages and limited access to reliable electricity. Small battery-powered devices such as LED lighting systems, communication equipment, and portable electronic devices require a cost-effective and sustainable charging solution.

Students are required to analyze and compare different solar-powered battery charging systems, select the most appropriate system, and implement, test, and evaluate the most suitable system using electronic devices and circuits. The system must regulate charging voltage and current, provide battery protection, and achieve efficient energy utilization under varying environmental conditions.

The problem contains multiple constraints including cost, component selection, charging efficiency, safety, environmental conditions, and user requirements, making it a Broadly Defined Technology Problem.

2. Classification as a Broadly Defined Problem

S. No.	BDP Code	Characteristics	Description
1	SP1	Requirements	Partially defined
2	SP2	Solutions	Multiple feasible solutions
3	SP3	Constraints	Cost, efficiency, safety, reliability
4	SP4	Stakeholders	End users, technicians, community
5	SP5	Technology	Electronic devices and analog circuits
6	SP6	Risk Level	Moderate
7	SP7	Use of Standards	Battery charging and safety guidelines

3. Objectives

Students shall be able to:

- i. Analyze charging requirements of rechargeable batteries.
- ii. Select appropriate electronic devices and components.
- iii. Analyze charging and protection circuits.
- iv. Construct and test a working prototype.
- v. Evaluate efficiency and performance.
- vi. Present engineering and economic justification for their design.

4. Scope

Included	Excluded
Solar panel interface Rectification and regulation circuits Charging controller Protection circuitry Performance testing	Commercial certification Large-scale deployment Grid-connected operation

5. Methodology

Phase	Description	Activities
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Phase 1:	Problem Analysis	Study battery specifications. Determine charging requirements. Identify design constraints
Phase 2:	Design Comparison and Selection of	Comparison of design options Selection rationale Selection of Design
Phase 3:	Circuit Implementation	Implement regulator circuit. Implement charging controller. Perform simulation.
Phase 4:	Prototype Development	Component selection. PCB/Breadboard implementation. Assembly and debugging.
Phase 5:	Testing	Voltage regulation tests. Charging efficiency tests. Safety verification.
Phase 6:	Evaluation	Performance comparison. Cost analysis. Design improvements.

6. Expected Outcomes

Students will produce:

- Functional charging prototype
- Circuit diagrams
- Simulation results
- Test data
- Technical report
- Oral presentation

7. CLO-PLO Mapping

Course Learning Outcome	CLO Statement	Taxonomy (Level)	Program Learning Outcome
CLO-2	Analyze semiconductor-device-based circuits to implement practical solutions.	C-4	PLO-2 / SA-2
CLO-3	Construct and test basic electronic circuits for rectification, regulation, clipping, clamping, and biasing applications.	P-4	PLO-4/ SA-4
CLO-4	Prepare and present technical reports using measured characteristics, waveforms, simulation results, and circuit-performance interpretation. .	A-2	PLO-9/ SA-9

8. Assessment Criteria

Assessment Criteria with Sydney Accord Mapping:

Component	Weight (%)	Evidence	Sydney Accord Competency
Problem Analysis	10	Requirements, constraints, stakeholder analysis	SA2: Problem Analysis
Alternative Solutions & Engineering Technology Judgment	10	Comparison of design options and selection rationale	SA3: Design/ Development of Solutions
Circuit Implementation	20	Functional hardware/software implementation	SA1: Engineering Knowledge
Prototype Development	20	Functional hardware/software implementation	SA1: Engineering Knowledge

Testing & Validation	15	Experimental data, measurements, performance evaluation	SA4: Investigation
Technical Report	15	Written communication	SA9: Communication
Presentation	10	Technical presentation and defense	SA9: Communication
Total	100		

9. Evaluation Rubric

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Poor (1)	Unsatisfactory (0)
Problem Analysis	Complete and justified	Mostly complete	Partially complete	Weak understanding	No understanding
Alternative Solutions & Engineering Technology Judgment	Complete and justified	Mostly complete	Partially complete	Weak understanding	Component Missing
Circuit Design	Innovative and correct	Functional design	Minor deficiencies	Major flaws	Circuit not designed
Prototype	Fully operational	Mostly operational	Partially functional	Non-functional	Prototype Missing
Testing	Comprehensive testing	Adequate testing	Limited testing	Insufficient testing	No evidence of testing
Report	Professional quality	Good quality	Acceptable	Poor	No report submitted
Presentation	Clear and confident	Good delivery	Adequate	Weak	Not Presented

Note to Instructor: A Broadly Defined Problem should not be assessed solely whether the prototype works. Assessment must evaluate the students' ability to analyze the problem, identify constraints, evaluate alternatives, exercise engineering judgment, develop and validate solutions, use modern tools, communicate findings, consider societal and sustainability implications, and manage project resources. Collectively, these demonstrate attainment of the Sydney Accord Graduate Attributes expected of Engineering Technologists.

10. Industry 5.0 Alignment

To align with Industry 5.0 requirements, students shall evaluate how their proposed solution contributes to sustainability, renewable energy utilization, user-centric design, and societal benefit.

Sample – II (Broadly Defined Problem)

Course: Industrial Automation

Title: PLC-Based Industrial Automation Solution for Manufacturing Process Control

1. Problem Statement

Modern manufacturing facilities continuously seek improvements in productivity, operational safety, reliability, product quality, and resource utilization. Students shall analyze a selected industrial process and design, implement, test, and validate a PLC-based automation solution with process monitoring, sequential control, field device control, HMI interaction, alarm handling, and safe operation under industrial constraints.

2. Classification as a Broadly Defined Problem

S. No.	BDP Code	Characteristics	Description
a.	SP1	Requirements	Partially defined
b.	SP2	Solutions	Multiple feasible solutions
c.	SP3	Constraints	Cost, safety, reliability, standards

d.	SP4	Stakeholders	Operators, maintenance staff, management
e.	SP5	Technology	PLCs, HMIs, sensors, actuators
f.	SP6	Risk Level	Moderate
g.	SP7	Use of Standards	Industrial automation and safety standards

3. Objectives

Students shall be able to:

- i. Analyze automation requirements
- ii. Select suitable control strategy
- iii. Develop PLC programs
- iv. Integrate sensors and actuators
- v. Design HMI interfaces
- vi. Test and validate system performance.

4. Scope

Included	Excluded
PLC programming, HMI, alarms, integration, validation.	Commercial deployment, ERP integration, certification

5. Methodology

Phase	Description	Activities
Phase 1:	Problem Analysis	Study industrial automation and PLC specifications. Determine different requirements. Identify design constraints
Phase 2:	Design Selection	Comparison of design options Selection rationale Selection of Design
Phase 3:	System Design	Implement ladder logic. Implement PLC controller. Perform simulation.
Phase 4:	PLC Programming & Integration	Component selection. PLC module selection. Assembly and debugging.
Phase 5:	HMI & Alarm Implementation	Implement HMI Implement Alarm system
Phase 6:	Testing & Validation	Logic and constraint tests. Ladder logic tests. Safety verification
Phase 7:	Evaluation	Performance comparison. Cost analysis. Design improvements.

6. Expected Outcomes

Students will produce:

- i. Functional PLC automation system,
- ii. PLC code,
- iii. HMI screens,
- iv. Wiring diagrams,
- v. test results,

- vi. report and
- vii. presentation.

7. Assessment Criteria

Assessment Criteria with Sydney Accord Mapping

Component	Weight (%)	Evidence	Sydney Accord Competency
Problem Analysis	10	Requirements, constraints, stakeholder analysis	SA2: Problem Analysis
Alternative Solutions	10	Comparison of design options and selection rationale	SA3: Design/ Development of Solutions
System Design	15	Functional hardware/software implementation	SA1: Engineering Knowledge
PLC Integration	20	Functional hardware/software implementation	SA1: Engineering Knowledge
HMI	10	Functional HMI implementation	SA1: Engineering Knowledge
Testing	15	Experimental data, measurements, performance evaluation	SA4: Investigation
Technical Report	10	Written communication	SA9: Communication
Presentation	10	Technical presentation and defense	SA9: Communication
Total	100		

8. Evaluation Rubric

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Poor (1)	Unsatisfactory (0)
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PLC Integration	Fully operational	Mostly operational	Partially functional	Non-functional	Prototype Missing
HMI	Fully operational	Mostly operational	Partially functional	Non-functional	Prototype Missing
Testing	Comprehensive testing	Adequate testing	Limited testing	Insufficient testing	No evidence of testing
Technical Report	Professional quality	Good quality	Acceptable	Poor	No report submitted
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Note to Instructor: A Broadly Defined Problem should not be assessed solely whether the prototype works. Assessment must evaluate the students' ability to analyze the problem, identify constraints, evaluate alternatives, exercise engineering judgment, develop and validate solutions, use tools, communicate findings, consider societal and sustainability implications, and manage project resources. Collectively, these demonstrate attainment of the Sydney Accord Graduate Attributes expected of Engineering Technologists.

9. Industry 5.0 Alignment

Human-centric automation, safety, sustainability, energy efficiency, reliability, digital transformation, productivity improvement.

APPENDIX K: Matrix view of HEC's NC vs GA vs PC

Matrix View (Graduate Attributes vs Professional Competencies)

S. No.	GA	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13
1	SA1	●	●	●	○								○	
2	SA2		●	○	●								○	
3	SA3		○	●		●	○						●	
4	SA4		○		●	●							○	
5	SA5				○	●	●						○	
6	SA6						●	●	●				○	
7	SA7							○	○	●				
8	SA8										●	○		
9	SA9										○	●		
10	SA10						○				●	●	●	
11	SA11												○	●

Legend:

- = Strong Relationship
- = Supporting Relationship

Matrix View (National Competencies vs Graduate Attributes)

HEC's NC	SA1	SA2	SA3	SA4	SA5	SA6	SA7	SA8	SA9	SA10	SA11
NC1	S				S						M
NC2	M	S		S	S						
NC3		S	M	M							
NC4			S		M					M	
NC5								M	S		
NC6								S	M	M	
NC7			M							S	M
NC8						M	S				
NC9						S	M				
NC10	M										S

Legend:

- S = Strong Mapping
- M = Moderate Mapping

Matrix View (National Competencies vs Professional Competencies)

HEC's NC	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13
NC1	S				S								M
NC2		S		S	S								
NC3		S	S	M									
NC4			S		M							S	
NC5										M	S		
NC6										S	M	M	
NC7			M							M		S	M
NC8							M		S				
NC9							S	S					
NC10	M												S

Legend:

S = Strong Mapping

M = Moderate Mapping

Tabulated View (National Competencies vs Graduate Attributes vs Professional Competencies)

HEC's NC	HEC's National Competency (NC)	Sydney Accord Graduate Attributes (SA)	Professional Competencies (PC)
NC1	Digital and Computing Foundations	SA1, SA5, SA11	PC1, PC5, PC13
NC2	Data and AI Literacy	SA1, SA2, SA4, SA5	PC2, PC4, PC5
NC3	Critical Thinking and Problem Solving	SA2, SA3, SA4	PC2, PC3, PC4
NC4	Design, Creativity and Innovation	SA3, SA5, SA10	PC3, PC5, PC12
NC5	Communication and Media Literacy	SA9, SA8	PC11, PC10
NC6	Leadership, Teamwork and Collaboration	SA8, SA9, SA10	PC10, PC11, PC12
NC7	Entrepreneurship and Management	SA10, SA3, SA11	PC12, PC10, PC13
NC8	Ethics and Values	SA7, SA6	PC9, PC7
NC9	Sustainability and Citizenship	SA6, SA7	PC7, PC8
NC10	Lifelong Learning and Adaptability	SA11, SA1	PC13, PC1



APPENDIX L: Acknowledgements

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Prof. Dr. Adeel Akram, Vice Chancellor, Punjab Tianjin University of Technology (PTUT), Lahore — Co-Convener

Dr. Muhammad Ayub Tareen, BUIITEMS, Quetta — Secretary

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Curriculum for Bachelor of Science in Electronic Engineering Technology



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Other NCRC Members and Institutional Representatives

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