Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

(An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune)

Exit Policy

of

First, Second and Third Year B.Tech. E&TC Engineering
(NEP 2020 aligned)

Effective from Academic Year 2024-25

Course Approval Summary

Board of Studies - Department of E&TC Engineering

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1.	LED repairing and maintenance	BET22Ex11	11	
2.	CCTV installation	BET22Ex12	12	
3.	DTH Set top box installation and servicing	BET22Ex13	13	
4.	LED TV repairing and maintenance	BET22Ex14	14	
5.	Printed Circuit Board(PCB) design	BET24Ex11	16	
6.	Battery System Repairing	BET24Ex12	17	
7.	LABVIEW Certification	BET24Ex13	18	
8.	MATLAB Certification	BET26Ex11	20	
9.	IoT hardware analysis	BET26Ex12	21	
10.	Computer Networking	BET26Ex13	22	
11.	Project Management in Electronics	BET26Ex14	23	
12.	Internship	BET22Ex15/ BET24Ex15/ BET26Ex15	25	

Chairman
BoS, Electronics & Telecommunication Engineering
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Approved by Academic Council:

Chairman
Academic Council
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Chairman, Academic Council
Pimpri Chinchwad College of Engineering

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an ability to think and act independently in demanding situations.

EOMS Policy

“We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

We shall strive for technical development of students by creating globally competent and sensible engineers, researchers and entrepreneurs through Quality Education.

We are committed for Institute’s social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS).”

Multiple Exit Options

Preamble :

Pimpri Chinchwad College of Engineering (PCCoE) is an autonomous institute affiliated to Savitribai Phule Pune University (SPPU). PCCOE has started implementing National Education Policy 2020 (NEP 2020) from the academic year 2023-24. NEP 2020 emphasizes holistic development, flexible curriculum, integration of technology in teaching and learning processes and multidisciplinary approach. University Grant Commission (UGC) in its guidelines for multiple entry and exit highlights flexible learning leading to the award of certificate, diploma, and degree. To meet the objectives of NEP 2020, PCCoE is offering a flexible curriculum with multiple exit options in line with directives received from Higher and Technical Education Department of Government of Maharashtra.

PCCoE recommends a 4 years multidisciplinary Bachelor's programme as the preferred option since it allows the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on major and minor subjects as per the student's preference.

However, in case of unavoidable circumstances if students need to give up their education they can opt to exit at the end of 2^{nd} or 4^{th} or 6^{th} semester after completing additional 8 credits as prescribed in this document. Students will be allowed to take the exit option after counseling by class teacher, proctor, academic coordinator and head of the department.

Students need to register in Academic Bank of Credit (ABC) for availing this option. The Academic Bank of Credits (ABC), a National-level facility provides flexibility of the curriculum framework and interdisciplinary/multidisciplinary academic mobility of students across the Higher Education Institutes (HEIs) in the country with appropriate "Credit Transfer" mechanism. It would facilitate credit accumulation through the facility created by the ABC scheme in the "Academic Bank Account" opened for students across the country to transfer and consolidate the credits earned by them by undergoing courses in any of the eligible HEIs (PCCoE). The ABC allows for credit redemption through the process of commuting the accrued credits in the Academic Bank Account maintained in the ABC for the purpose of fulfilling the credits requirements for the award of certificate/diploma/degree by the authorized HEIs (PCCoE). Upon collecting a certificate, diploma or degree, all the credits earned till then, in respect of that certificate, diploma or degree, shall stand debited and deleted from the account concerned.

Multiple Exits:

Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs. The student has to earn the minimum credits as mentioned in table 1 and should not have any backlogs. The student has to submit a request for exiting the programme to the Academic Council Chairman through the BoS

Chairman within 2 weeks of declaration of results. The additional 8 credits need to be earned during the Summer Vacation (within 2 months of approval of Exit Request).

Table 1: Exit option after 2nd or 4th or 6th Semester [Ref: NEP GR, Government of Maharashtra Point 2 and Point 7]

Sr. No.	Levels and Semester Completion	Qualification Title	Regular Credit Requirement	Additional Credits to be Earned
1	Level : 4.5 Semester 2	One Year UG Certificate in the relevant Discipline	Minimum 40 credits	8 Credits of VSEC/Internship/ Apprenticeship as per the relevant programme
2	Level:5.0 Semester :4	Two Year UG Diploma in the relevant Discipline	Minimum 80 credits	8 Credits of VSEC/Internship/Mini Project as per the relevant programme
3	Level 5.5 Semester:6	Three Year B. Voc/ B.Sc in the relevant Discipline	Minimum 120 credits	8 Credits of VSEC/Internship/Mini Project as per the relevant programme

The table 1 is interpreted as follows.

Students exiting the First Year programme after securing minimum 40 credits will be awarded one year UG Certificate in the relevant Discipline provided they secure 8 credits in work-based vocational courses or internship / Apprenticeship offered during summer vacation in addition to 4 credits from skill-based courses earned during the first and second semester.

Students exiting the Second Year Programme after securing minimum 80 credits will be awarded Two Years UG Diploma in the relevant Discipline provided they secure additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc.) offered during summer vacation after the fourth semester.

Students exiting the 3-year UG program will be awarded Three Years B. Voc./ B.Sc in the relevant Discipline upon securing minimum 120 credits with additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc.) offered during summer vacation after the sixth semester.

Exit options shall be provided with Certification, Diploma and B. Vocational/ B.Sc degrees to the students at the end of the second, fourth and sixth semester, respectively, in the four-year degree programme. However the duration of completion of UG Engineering Degree Program is 8 years from the date of admission to first year.

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Curriculum Structure
Exit Courses
E&TC Engineering

CURRICULUM STRUCTURE

First Year B. Tech. (E&TC Engineering) Exit Programme Semester – II

First Year B. Tech E&TC Engineering (Academic Regulations 2024) (With effect from Academic Year 2024-25)																
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**			**Evaluation Scheme and Marks**							
		L	**P**	**T**	**Total**	**L**	**P**	**T**	**FA**		**SA**	**TW**	**PR**	**OR**	**Total**
									FA 1	**FA 2**					
BET22Ex11	LED repairing and maintenance	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET22Ex12	CCTV installation	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET22Ex13	DTH Set top box installation and servicing	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET22Ex14	LED TV repairing and maintenance	-	2	-	2	-	4	-	-	-	-	100	-	-	100
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**400**	**-**	**-**	**400**
OR															
BET22Ex15	Internship	-	8	-	8	-	16	-	-	-	-	200	-	200	400
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**200**	**-**	**200**	**400**

Second Year B. Tech. (E&TC Engineering) Exit Programme: Semester IV

Second Year B. Tech E&TC Engineering (Academic Regulations 2024) (With effect from Academic Year 2024-25)																
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**			**Evaluation Scheme and Marks**							
		L	**P**	**T**	**Total**	**L**	**P**	**T**	**FA**		**SA**	**TW**	**PR**	**OR**	**Total**
									FA 1	**FA 2**					
BET24Ex11	Printed Circuit Board(PCB) design	-	4	-	4	-	8	-	-	-	-	200	-	-	200
BET24Ex12	Battery System Repairing	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET24Ex13	LABVIEW Certification	-	2	-	2	-	4	-	-	-	-	100	-	-	100
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**400**	**-**	**-**	**400**
OR															
BET24Ex15	Internship	-	8	-	8	-	16	-	-	-	-	200	-	200	400
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**200**	**-**	**200**	**400**

Note: 8 credits need to be earned immediately after the end of even semesters.The duration of internship must be 1-2 months.

Third Year B. Tech. (E&TC Engineering) Exit Programme Semester – VI

Third Year B. Tech E&TC Engineering (Academic Regulations 2024) (With effect from Academic Year 2024-25)															
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**			**Evaluation Scheme and Marks**						
		L	**P**	**T**	**Total**	**L**	**P**	**T**	**FA**		**SA**	**TW**	**PR**	**OR**	**Total**
									FA 1	**FA 2**					
BET26Ex11	MATLAB Certification	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET26Ex12	IoT hardware analysis	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET26Ex13	Computer Networking	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET26Ex14	Project Management in Electronics	-	2	-	2	-	4	-	-	-	-	100	-	-	100
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**200**	**-**	**-**	**400**
OR															
BET26Ex15	Internship	-	8	-	8	-	16	-	-	-	-	200	-	200	400
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**200**	**-**	**200**	**400**

L-Lecture, **P**-Practical, **T**-Tutorial, **FA**–Formative Assessment, **SA**-End Term Evaluation, **TW**-Term Work, **OR**-Oral, **PR**-Practical

Syllabus Exit Programme Semester – II

Program:	B. Tech. (E&TC)						Semester: II	
Course:	LED repairing and maintenance						Code:	BET22Ex11
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	100	-	-	100	

Prior knowledge of

1. Basics of Electronics Hardware **is essential.**

Course Objectives:

1. Develop Technical Proficiency in LED Panel Repair.
2. Understand and Implement Preventive Maintenance Practices.

Course Outcomes:

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

1. Effectively diagnose and repair a wide range of issues in LED panels, utilizing appropriate tools and techniques to ensure functionality and reliability.
2. Adept at creating and executing maintenance schedules, conducting routine inspections, and applying preventive measures to minimize the risk of future malfunctions.

Detailed Syllabus

Topic	Suggested Topics
1	**Diagnosing and Troubleshooting Common LED Panel Issues**: Practice identifying and diagnosing common problems in LED panels, such as dead pixels, flickering screens, power supply issues, and connectivity problems. Use diagnostic tools like multimeters, oscilloscopes, and signal generators to pinpoint faults.
2	**Component Replacement and Soldering Techniques**: Hands-on training in replacing faulty components, such as LEDs, resistors, capacitors, and power supply units. Practice soldering and desoldering techniques to ensure proper component installation and removal.
3	**Power Supply and Circuit Testing**: Test and troubleshoot power supply circuits within LED panels, ensuring they provide the correct voltage and current. Learn to repair or replace faulty power supply units and components.
4	**Firmware and Software Updates**: Practice updating the firmware and software of LED panels to the latest versions. Learn how to calibrate and configure settings through software interfaces to ensure optimal performance.
5	**Preventive Maintenance and Cleaning**: Perform preventive maintenance tasks such as cleaning LED panels, inspecting for wear and tear, and checking for loose connections. Create and follow a maintenance schedule to keep LED panels in top condition, documenting procedures and findings for future reference.

Total Duration -30 Hours

References:

- "Practical Electronics for Inventors" by Paul Scherz and Simon Monk
- "The Art of Electronics" by Paul Horowitz and Winfield Hill
- "LED Lighting: Technology and Perception" by Maurizio Rossi
- "Troubleshooting and Repairing Consumer Electronics Without a Schematic" by Homer L. Davidson
- "Modern Electronic Maintenance Principles" by H. A. Watson
- "Electronic Troubleshooting, Fourth Edition" by Daniel R. Tomal and Neal S. Widmer
- "LED Lighting: Technology, Application, and Perception" edited by Salvatore Musumeci

Program:	B. Tech. (E&TC)						Semester:II
Course:	CCTV Installation						Code: BET22Ex12
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of

2. Basics of Electronics Hardware
3. Basic software and hardware tools

is essential.

Course Objectives:

1. To identify functional components of CCTV system through visual inspection and by use of different tools.
2. To realize CCTV installation requirement in terms of equipment, system, tools ,To install and maintain CCTV surveillance system.

Course Outcomes:

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

3. Proficiency in CCTV System Setup and Configuration
4. Equipped with the skills of Effective Troubleshooting and Maintenance of CCTV Systems.

Guidelines:

Detailed Syllabus

Topic	Suggested Topics
1	Introduction To Electronics Security System and Components Of Cctv Surveillance System
2	Installation of CCTV surveillance System:- Cables, Types of Network, Network Devices, Hardware Installation
3	Server Installion and configuration:- Understanding Installation and Configuration method ,Assembly methods ,Power supply Unit Assembly, Hard Disk Mounting, Software Installation , Trouble Shooting
4	Setup of CCTV Surveillance system:- Internet Addressing, Internet Protocols & Various Settings, DVR Configuration, NVR Configuration, Data Storage
5	Remote Viewing & Remote Access Of Cctv: Connecting Your Recorder ,Enabling Remote Viewing , Installing Viewing Software ,Connecting to Smartphone - Using Web Services.

Total Duration -30 Hours

References:

- Data Communication and Networking, Behrouz A. Forouzan, McGraw-Hill

CCTV Handbook: Buying, Installing, Configuring, & Troubleshooting A User's Guide to CCTV Security by Thomas Hill

- CCTV cameras training: A training book for analogue CCTV cameras by M.J Ansari
- Professionalism—Skills for Workplace Success, Lydia E. Anderson and Sandra B. Bolt, 4e, Pearson Education/PHI

Program:	B. Tech. (E&TC)						Semester: II	
Course:	DTH and Set Top Box Installation and Repairing						Code:	BET22Ex13
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	100	-	-	100	

Prior knowledge of

1. Basics of Electronic Engineering
2. Basic Electronics Communication Systems **is essential.**

Course Objectives:

1. To provide students with a thorough understanding of the installation, alignment, troubleshooting, and repair of DTH set-top box systems.
2. To teach students systematic methods for diagnosing and resolving common issues in DTH systems.

Course Outcomes:

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

1. Apply knowledge to install DTH set-top boxes and analyze the installation process to ensure proper setup and operation.
2. Evaluate signal strength and troubleshoot issues to restore optimal signal reception.

Detailed Syllabus

Topic	Suggested Topics
1	**Basic Installation of a DTH Set Top Box.** Introduction and safety, tool usage, site survey and dish placement, cabling and connections, alignment and signal testing, and troubleshooting.
2	**Aligning the Satellite Dish.** Introduction to satellite communication, safety protocols, and equipment overview. Site survey techniques for dish placement, understanding the line of sight, and signal interference.Practical use of signal meters and receivers for measuring and optimizing signal strength. Advanced techniques in azimuth and elevation adjustments troubleshooting alignment issues. Application through group exercises and case studies, simulating real-world scenarios.
3	**Troubleshooting Signal Issues.** Introduction to satellite communication systems and safety protocols. Identifying and understanding common signal issues (e.g., signal loss, pixelation, intermittent reception). Practical use of signal meters and diagnostic tools for systematic testing and analysis. Techniques for resolving signal issues, including adjusting dish alignment, checking cable connections, and optimizing signal paths.
4	**Software Update and Configuration.** Introduction to software update procedures and safety protocols. Understanding the importance of software updates in satellite systems. Practical demonstration of software update methods for set-top boxes and satellite receivers. Configuration techniques for optimizing system performance and compatibility and troubleshooting common issues related to software updates and configurations. Hands-on practice and simulations to apply learned techniques effectively.
5	**Replacing Faulty Components.** Introduction to component replacement procedures and safety guidelines. Identification and diagnosis of faulty components in satellite receivers and set-top boxes. Hands-on demonstration of component removal and installation techniques. Practical exercises in soldering and desoldering components as necessary. Test and verify replaced components to ensure functionality. Troubleshooting common issues encountered during component replacement.
	Total Duration -30 Hours

References:

1. S. Tirró, Satellite Communication Systems Design. Springer Science & Business Media, 2012.
2. B. R. Elbert, Introduction to Satellite Communication. Artech House, 2008.
3. A. K. Maini and V. Agrawal, Satellite Technology. John Wiley & Sons, 2007.
4. M. O. Kolawole, Satellite Communication Engineering. 2017. doi: 10.1201/b16116.
5. G. Corazza, Digital Satellite Communications. 2007. doi: 10.1007/978-0-387-34649-6.

Program:	B. Tech. (E&TC)						Semester: II	
Course:	LED TV repairing and maintenance						Code:	BET22Ex14
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	100	-	-	100	

Prior knowledge of

1. Basics of Electronic Engineering
2. Basic Electronics Communication Systems**is essential l.**

Course Objectives:

1. Equip students with skills to diagnose and resolve issues in LED TVs systematically.
2. Provide students with the ability to implement effective repair solutions for various LED TV malfunctions.

Course Outcomes:

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

1. Apply knowledge of LED TV components to troubleshoot and diagnose issues using appropriate tools and methods effectively.
2. Implement repair solutions with proficiency, ensuring the proper functioning of LED TVs and demonstrating competency in electronics repair.

Detailed Syllabus

Topic	Suggested Topics
1	**Introduction to LED TV Troubleshooting and Component Identification.** Basics of LED TV technology and operational principles. Safety precautions and equipment overview for handling LED TVs. Hands-on practice in using multimeters and other diagnostic tools. Step-by-step guidance on troubleshooting common LED TV issues. Application of diagnostic techniques to real-world scenarios and case studies.
2	**Diagnostic Techniques for LED TV Power Supply Board and Repair.** Introduction to LED TV power supply board functions and safety protocols. Practical demonstrations of using oscilloscopes and multimeters for voltage and waveform analysis. Step-by-step guidance on troubleshooting and diagnosing power supply faults. Hands-on practice in identifying faulty components like capacitors, diodes, and transformers. Application of repair techniques, including component replacement and soldering.
3	**Understanding and Updating Firmware on LED TV Main Board.** Introduction to firmware and its role in LED TV operation. Practical demonstration of firmware update methods for LED TV main boards. Techniques for verifying firmware versions and compatibility. Troubleshooting common issues related to firmware updates and recovery methods.
4	**Hands-on Practice: Testing and Replacing LED TV Backlights.** Introduction to LED TV backlight technology and safety guidelines. Identification of backlight types and their functions in LED TVs. Hands-on practice in using backlight testers and multimeters for testing. Step-by-step guidance on diagnosing and replacing faulty backlights. Techniques for disassembling and reassembling LED TV panels. Troubleshooting common issues encountered during backlight replacement.
5	**Repair and Verification of HDMI Ports on LED TVs.** Introduction to HDMI technology and safety precautions for handling electronic components. Hands-on practice using diagnostic tools like HDMI testers and multimeters to assess port functionality. Step-by-step guidance on repairing HDMI ports, including soldering techniques and component replacement. Verification methods to ensure repaired HDMI ports meet operational standards and deliver optimal performance.
	Total Duration -30 Hours

References:

1. D. Baxter, A Practical Guide to Television Sound Engineering. Taylor & Francis, 2014.
2. L.-I. Lundstrom, Understanding Digital Television. CRC Press, 2012.
3. R. R. Gulati, Modern Television Practice. 2020.
4. T. Malekar, "Mastering TV Repair. Independently Published, 2024.
5. B. Gross, The TVs of Tomorrow. University of Chicago Press, 2018.

Syllabus Exit Programme Semester –IV

Program:	B. Tech. (E&TC)						Semester: IV
Course:	Printed Circuit Board(PCB) design						Code: BET24Ex11
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
4	-	8	-	200	-	-	200

Prior knowledge of

1. Basic Electronics Engineering

is essential.

Course Objectives:

1. To introduce students to various hardware & software tools used for circuit simulation and PCB design.
2. To make students acquainted with the electronics, including reading and implementation of schematics.
3. To develop practical skills required for designing electronics projects

Course Outcomes:

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

1. Identify electronic components symbols & footprints
2. Demonstrate a PCB schematic of an analog / digital circuit.
3. Apply practical knowledge and skills by the development of electrical & electronics systems using suitable tools

Detailed Syllabus

Topic	Suggested Topics
1	Overview of Electronic Circuit Simulation and Layout Software Basics of circuit simulation, Overview of various open-source and commercial EDA tools for circuit design, simulation and PCB design, Demonstration of Analog and Digital Circuit Simulation **Activity Assignment1:** 1. Implementing a circuit in the EDA tool (Voltage dividers, Op-Amp, Timer circuits, etc.) 2. PSpice tools and working 3. Simulation of analog and digital circuits
2	Introduction to PCB Design software Schematic Entry, Netlist Creation, working with component libraries, Design of Boards, Layout of Parts, Optimizing Parts Placements, Pads and Vi a, Manual and Auto Routing, Handling Multiple Layers, Gerber files, Gerber View **Activity Assignment 2:** 1. Implementing PCB Layout in PCB Design tool (Power supply, Inverter, Microcontroller based circuit, etc.) 2. Fabrication of PCB 3. Assembling components and Soldering on PCB.

Total Duration -30 Hours

References:

1. Farid N. Nazm, Circuit Simulation, Wiley, 1st edition
2. Bossart, Printed Circuit Boards: Design and Technology, Tata McGraw Hill, 1st edition
3. Franco, Design with Operational Amplifiers & Analog Integrated Circuits, Tata McGraw Hill, 3rd edition
4. Horowitz & Hill, The Art of Electronics; Cambridge University Press, 3rd edition
5. Mitzner.K, Complete PCB Design Using Orcad Capture and Layout, Elsevier/ Newnes, 1st edition
6. Félix E. Guerrero-Castro and Ofelia Cervantes-Villagomez, Advanced Circuit Simulation Using Multisim
7. Workbench, Morgan & Claypool Publishers, 1st edition
8. R. L. Boylstad, L. Nashlesky, Electronic Devices and circuits Theory, Prentice Hall of India, 9th edition
9. Dr. R. S. Sedha, Digital Electronics, S. Chand Publications, 3rd edition

Program:	B. Tech. (E&TC)					Semester: IV	
Course:	Battery System Repairing					Code:	BET24Ex12
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of

1. Basics of semiconductor Physics, Chemistry
2. Basic Electronics Engineering **is essential.**

Course Objectives:

1. To provide the students with knowledge of battery reparing.
2. To equip students with the skills necessary to design battery pack and test a battery.

Course Outcomes:

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

1. Identify basic equipments /tools required for testing complete battery system.
2. Design battery pack for EV and further understand the process of waste management.

Detailed Syllabus

Topic	Suggested Topics
1	Tools and equipments required for repairing a complete battery system
2	Design of battery pack for Electric Vehicle
3	Battery Pack Tests/ Trouble shooting of battery
4	Testing of Battery System
5	Workplace hazards, safety, health and warning signs, emergency signs/ Waste management methods for waste disposal
	Total Duration -30 Hours

References:

1. D. Linden and T. S. Reddy, “Handbook of Batteries,” 3rd Edition, McGraw-Hill, 2002.
2. Vincent Cocron, "Introduction to EV Systems and Battery Technology", CRC Press in 2020

NPTEL:

1. Fundamentals of Electric vehicles: Technology & Economics : https://nptel.ac.in/courses/108106170
2. Electric Vehicles - Part 1: https://onlinecourses.nptel.ac.in/noc22_ee53/preview

Coursera :

1. Batteries and Electric Vehicles: https://www.coursera.org/learn/batteries-and-electric-vehicles
2. Electric Vehicles and Mobility: https://www.coursera.org/learn/electric-vehicles-mobility

Program:	B. Tech. (E&TC)					Semester: IV	
Course:	LABVIEW Certification					Code:	BET24Ex13
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of

1. Basics of Mathematics **is essential.**

Course Objectives:

1. To introduce the basics of LABVIEW programming and its environment.
2. To develop the ability to create simple virtual instruments (VIs) using LABVIEW.
3. To provide practical experience through hands-on exercises and examples.
4. To build a foundational understanding of LABVIEW for further study and application.

Course Outcomes:

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

1. Navigate the LABVIEW interface and Create and manipulate simple VIs.
2. Perform basic data acquisition and analysis and create simple graphical user interfaces (GUIs).
3. Implement basic programming structures in LABVIEW.

Detailed Syllabus

Topic	Suggested Topics
1	**Introduction to LABVIEW Environment (4 Hours)** Overview of LABVIEW interface, Navigating the LABVIEW workspace, Basic functions and operations, Using the help and documentation features
2	**Introduction to Basic Operations in LABVIEW (6 Hours)** Creating and Running Simple Vis: Introduction to Virtual Instruments (VIs), Creating and saving a VI, Running and stopping a VI Basic Data Types and Structures: Understanding controls and indicators, Basic data types: numeric, Boolean and string, Using simple data structures: arrays and clusters
3	**Basic Programming in LABVIEW (6 Hours)** Programming Structures: Introduction to data flow programming, Using structures: For loops, While loops, Case structures Basic Functions and Operators: Mathematical functions and operations, Logical and comparison operators, Using built-in functions
4	**Data Acquisition and Analysis (8 Hours):**Introduction to Data Acquisition: Understanding data acquisition concepts, Setting up and configuring data acquisition hardware.Acquiring and Displaying Data: Acquiring data from sensors and instruments, Displaying data using charts and graphs, Basic data logging Basic Data Analysis: Simple statistical analysis, Using analysis functions (mean, standard deviation, etc.), Visualizing analysis results.
5	**Creating Graphical User Interfaces (6 hours)** Designing User Interfaces: Introduction to front panel controls and indicators, Designing simple user interfaces Customizing GUIs: Customizing the appearance of controls and indicators, Creating and using custom controls
	Total Duration -30 Hours

References:

1. LabVIEW for Everyone: Graphical Programming Made Easy and Fun by Jeffrey Travis and Jim Kring
2. LabVIEW Graphical Programming by Gary W. Johnson and Richard Jennings
3. LabVIEW: Advanced Programming Techniques by Rick Bitter, Taqi Mohiuddin, and Matt Nawrocki
4. Hands-On Introduction to LabVIEW for Scientists and Engineers by John Essick

Syllabus Exit Programme Semester –VI

Program:	B. Tech. (E&TC)					Semester: VI	
Course:	MATLAB certification					Code:	BET26Ex11
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of

1. Basics of Mathematics **is essential.**

Course Objectives:

1. To introduce the basics of MATLAB programming and its environment.
2. To develop the ability to perform simple computations and visualizations using MATLAB.
3. To provide practical experience through hands-on exercises and examples.
4. To build a foundational understanding of MATLAB for further study and application.

Course Outcomes:

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

1. Navigate the MATLAB interface and utilize basic commands and create and manipulate variables and arrays.
2. Perform basic arithmetic and logical operations and Create simple plots and visualizations.
3. Write and execute basic scripts and functions. Import and export data for basic analysis.

Detailed Syllabus

Topic	Suggested Topics
1	**Introduction to MATLAB Environment (4 Hours)** Overview of MATLAB interface, Navigating the MATLAB workspace, Basic commands, and operations, Using the help and documentation features
2	**Introduction to Basic Operations in MATLAB (6 Hours)** • Understanding variables and data types in MATLAB: Creating and manipulating variables, Understanding data types: numeric, character, arrays, Basic operations with variables • Basic Plotting and Visualization in MATLAB: Introduction to plotting functions (plot, bar, pie), Customizing plots (labels, titles), Simple 2D plots
3	**Basic Programming in MATLAB (6 Hours)** • Scripts and Functions: Creating and running scripts, Introduction to functions, Function basics and calling functions • Control Flow and Logical Operations: Conditional statements (if, else), Loop structures (for, while), Basic logical operations
4	**Data Handling and Basic Analysis (8 Hours)** • Importing and Exporting Data: Reading and writing data from/to text files, Simple data import and export functions • Basic Data Manipulation: Sorting and filtering data, Basic statistical functions (mean, median, mode) • Basic Data Visualization: Advanced plotting functions (scatter, histogram), Creating subplots, Simple customizations
5	**Introduction to Arrays and Matrices (6 Hours)** • Working with Arrays: Creating and manipulating arrays, Basic array operations • Matrix Operations: Introduction to matrices, Basic matrix operations (addition, multiplication) • Matrix Applications: Solving simple linear equations, Introduction to eigenvalues and eigenvectors
	Total Duration -30 Hours

References:

1. Delores M Etter," Introduction to MATLAB", 4th edition, Pearson Edition
2. Misza Kalechman, "Practical MATLAB: Basics for Engineers", CRC Press, Taylor & Francis Group.
3. Sulaymon Eshkabilov, "Beginning MATLAB and Simulink", eBook ISBN: 978-1-4842-5061-7, Apress2019.
4. Craig S. Lent, "Learning to program with MATLAB: Building GUI Tool", Wiley Publications 2013, ISBN: 978-0-470-93644-3
5. https://www.mathworks.com/help/releases/R2014b/pdf_doc/matlab/getstart.pdf

Program:	B. Tech. (E&TC)						Semester: VI	
Course:	IoT Hardware Analysis						Code:	BET26Ex12
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	100	-	-	100	

Prior knowledge of

1. Communication System
2. Computer Networks

is essential.

Course Objectives:

1. To study the fundamentals about IoT.
2. To study the design methodology and different IoT hardware platforms.

Course Outcomes:

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

1. Identify sensors, actuators, IoT hardware platforms required to design a real time system.
2. Deploy an IoT application and connect to the cloud.

Guidelines: An appropriate cloud computing tools can be used for the implementation

Detailed Syllabus

Topic	Suggested Topics
1	Study of IoT Hardware Platforms and Cloud Platforms.
2	Study of Sensors and Actuators.
3	Interfacing of LED with Arduino Uno & NodeMCU.
4	IoT sensors and actuators interfacing with Arduino UNO/NodeMCU, Home Automation using NodeMCU.
5	Smart Agriculture system/Smart Irrigation System, Smart Dustbin/Smart Pollution Monitoring System.

Total Duration -30 Hours

References:

1. Arduino for Dummies, John Nussey, 2nd Edition, ISBN: 978-1119489542, For Dummies Publishing,2018
2. Programming Arduino: Getting started with sketches, 2ndEdition,Simon Monk, ISBN: 978-1259641633, Tata McGraw Hill Publication

Virtual Lab Links:-

1. https://docs.simuli.co/getting-started/arduino/arduino-ide-and-vlab
2. https://docs.simuli.co/getting-started/raspberry-pi/setting-up-iotify-virtual-lab

Program:	B. Tech. (E&TC)						Semester: VI	
Course:	Computer Networking						Code:	BET26Ex13
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	100	-	-	100	

Prior knowledge of

1. Communication System **is essential.**

Course Objectives:

1. To understand the fundamental concepts of networking standards, protocols and technologies.
2. To learn different layer protocols in the protocol stacks.

Course Outcomes:

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

1. Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies.
2. Illustrate the working and functions of ISO OSI layers stack.

Guidelines: An appropriate networking simulation tools can be used for the implementation

Detailed Syllabus

Topic	Suggested Topics
1	Practical use of networking commands: Ipconfig, Ping, pathping, Hostname, getmac, tracert, systeminfo, net, netstat, nslookup, telnet, ssh, ftp. Study of Networking components, Implementation of LAN
2	Share the folder/printer in LAN and access it, Simulation of Implementing Networking topology
3	Study of IP addressing and Subnetting, Implementation and configuration of subnetting using IP addressing in LAN.
4	Implementation of Web Serve, DNS Server, DHCP Server.
5	Simulation of configuration of Wi-Fi network.
	Total Duration -30 Hours

References:

1. Forouzan Behrouz A., Data Communications and Networking, MacGraw Hill, 2018.
2. Kurouse James and F. Rouse, Computer Networking: A Top-down Approach, Pearson Education, 2019.

Program:	B. Tech. (E&TC)					Semester: VI	
Course:	Project Management in Electronics					Code:	BET26Ex14
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of

Basic understanding of electronics principles **is essential.**

Course Objectives:

1. To introduce the fundamentals of project management tailored to the field of electronics.
2. To develop the ability to plan, execute, and manage electronic projects.
3. To provide practical experience through hands-on exercises and real-world examples.
4. To build a foundational understanding of project management tools and techniques for electronics projects.

Course Outcomes:

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

1. Develop project plans, including defining scope, schedules, and budgets.
2. Identify and manage project risks and resources.
3. Apply project management tools and software to real-world electronics projects.
4. Communicate effectively with team members and stakeholders.
5. Evaluate and close projects successfully.

Detailed Syllabus

Topic	Suggested Topics
1	**Introduction to Project Management in Electronics (6 Hours)** Definition and importance of project management, Key project management principles and terminology, Project initiation, planning, execution, monitoring, and closure, Differences between electronics projects and other types of projects
2	**Project Management Tools and Software (6 Hours)** Overview of popular project management tools (e.g., Microsoft Project, Trello, Asana), Selection criteria for choosing the right tool for electronic projects, Creating and interpreting Gantt charts, Using scheduling tools to plan project timelines, Visualizing project schedules and milestones
3	**Project Planning and Scheduling (6 Hours)** Defining project scope, objectives, and deliverables, Developing Project Schedules: Work Breakdown Structure (WBS), Budgeting and Resource Allocation
4	**Risk Management and Quality Assurance (6 Hours)** Identifying and Assessing Risks: Types of project risks, Risk identification techniques Risk Mitigation and Management: Developing risk mitigation strategies, Monitoring and controlling risks
5	**Project Execution and Monitoring (6 Hours)**Project Execution Strategies: Organizing project teams, Effective communication and collaborationMonitoring and Controlling Project Progress**:** Tracking project progress, Key performance indicators (KPIs)
	Total Duration -30 Hours

References:

1. Project Management for Engineering, Business and Technology by John M. Nicholas and Herman Steyn
2. Project Management: A Systems Approach to Planning, Scheduling, and Controlling by Harold Kerzner
3. Effective Project Management: Traditional, Agile, Extreme by Robert K. Wysocki
4. Electronics Project Management and Design by Paul A. Lynn

Internship Guidelines for Exit Programme
Semester – II, IV and VI

Program :	B.Tech (E&TC) Exit Programme(FY/SY/TY)					Semester: II/IV/VI	
Course :	Internship				Code :	BET22Ex15/BET24Ex15/ BET26Ex15	
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	PR	OR	Total
8	-	16	-	200	-	200	400

Preamble:

Internships are educational and career development opportunities, providing practical experience in a field. Employers are looking for employees who are properly skilled and have awareness of the industry environment,practices, and culture. The internship is structured, short-term, supervised training often focused on particular tasks or projects with defined time scales.

The core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry andunderstanding the social, economic, and administrative considerations that influence the working environmentof industrial organizations.

Course Objectives:

1. To expose students to the industry environment and enhance the technical skills while working in the private / public enterprises, government agencies, research labs, or any other organized technical club.
2. To apply knowledge and abilities relevant to engineering technology concepts, principles, and techniquesto real-life industrial work/projects.
3. To develop higher order thinking skills to work with people of diverse backgrounds and culturesand to work effectively within cross-disciplined environments.

Course Outcomes:

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

1. Demonstrate and apply the academic theory and integrate the fundamental concepts in practice throughinternship and record the industrial or project activities.
2. Apply appropriate methods and tools to understand and solve given problem and implement improvedwriting skills to prepare the report.
3. Deliver effective oral presentation by demonstrating effective communication and professional skillsand explore carrier opportunities.

Internship Guidelines:

1. The possible opportunities of internships can be availed from
   a. Industries
   b. Research labs or organization
   c. In-house research projects
   d. Online internships
2. Students can seek help from
   a. the Training and Placement cell along with departmental coordinators assistance
   b. the department / institute faculty members
   c. various personal contacts
   d. students can individually connect with the industries / organizations
3. Once industry / research organization is identified, student is required to get request letter from the E&TC Engineering Department duly signed by Head of the Department to seek an opportunity for the internship. The letter should be addressed to the HR manager or relevant authority and detailsshould be available with the students.
4. The students are requested to submit the confirmation letter from the industry or research organization or collegiate club to the Internship Coordinator and HOD Office
5. Students on joining the internship will submit the joining report / joining letter / or copy of the confirmation email to Internship Coordinator and HOD Office
6. A faculty member will be associated as a mentor for group of students. He/she will be responsible for monitoring, evaluation and assessment of student internship activities. Faculty is also requested to visit the internship place and submit the formal feedback to the Internship Coordinator.
7. Faculty members are advised to visit the place of internship once / twice during internship period and monitor the progress.

8. The students should submit the progress report fortnightly to the guide and final internship report to the internship coordinator and department office.
9. After completion of the internship, the mentor, along with the assessment panel members, should submit the evaluation report of the students in department office / internship coordinator.
10. Student should receive the Internship Certificate from industry and submit to the internship coordinator and department office.
11. Students shall give a presentation on the internship work carried as a part of Term work. The internship diary and report will be also verified and assessed.

Vision and Mission of E&TC Engineering Department

VISION:

To be recognized as a distinguished department in the field of electronics and telecommunication transforming students into competent technocrats by providing an Ethical, Sustainable and Value-Added Quality Education.

MISSION:

1. To create competent Electronics and Tele-communication engineers with Knowledge, Skill and Attitude by establishing a conducive learning environment.
2. To nurture technical competency, entrepreneurship skills and promote higher studies through the state-of-art facilities for building successful careers.
3. To facilitate research by engaging in projects of industrial requirement and national importance.
4. To impart Life skills, Ethical and Social values for self-sustainability.