

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2022
'B⁺⁺' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

(As per New Education Policy 2020)

Structure:- Electrical Engineering

Name of the Course: S. Y. B. Tech. (Sem.– III & IV)

(Syllabus to be implemented from-2024-25)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

B. Tech (Electrical Engineering)

PROGRAMME: BACHELOR OF ELECTRICAL ENGINEERING

PROGRAMME OBJECTIVES

A. PROGRAM EDUCATIONAL OBJECTIVES

1. Deliver fundamental as well as advanced knowledge with research initiatives in the field of electrical engineering with emphasis on state-of-the-art technology.
2. Graduates will demonstrate measurable progress in the fields they choose to pursue.
3. Design and develop technically feasible solutions for real world applications which are economically viable leading to societal benefits.
4. To nurture Graduates to be sensitive for ethical, societal and environmental issues while conducting their professional work.

B. PROGRAMME OUTCOMES

Students attain the following outcomes: -

- 1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- 6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12 **Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. PROGRAMME SPECIFIC OUTCOMES

- 1 An ability to specify, design and analyze Power System, Electrical Machinery, Electronic Circuits, Drive Systems, Lightning Systems and deliver technological solution by adapting advances in allied disciplines.
- 2 Apply knowledge of electrical engineering to meet the desired needs within realistic constraints viz. economical, ethical, and environmental and safety.
- 3 Apply modern software tools for design, simulation and analysis of electrical systems to successfully adapt in multi-disciplinary environments.



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FACULTY OF SCIENCE & TECHNOLOGY

NEP 2020 Compliant Curriculum

With effect from 2023-2024

Semester I (Common for All Engineering Branches)

Course Type	Course Code	Name of the Course	Engagement Hours		Credits	FA	SA		Total
			L	P		ESE	ISE	ICA	
BSC	BS-01/ BS-02	Engineering Physics / Engineering Chemistry \$	3	2	4	70	30	25	125
	BS-03	Engineering Mathematics-I	3	2	4	70	30	25	125
ESC	ES-01/ ES-02	Basics of Civil and Mechanical Engineering /Basic Electrical & Electronics Engineering \$	3	2	4	70	30	25	125
	ES-03	Engineering Mechanics	3	2	4	70	30	25	125
AEC	AE-01	Communication Skills	1	2	2		25	25	50
CC	CC-01	Sports and Yoga or NSS/NCC/UBA (Liberal Learning Course-I)	1	2	2			25	25
SEC	SE-01	Workshop Practices		2	1			25	25
		Total	14	14	21	280	145	175	600
		Student Induction Program**							

Semester II (Common for All Engineering Branches)

Course Type	Course Code	Name of the Course	Engagement Hours		Credits	FA	SA		Total
			L	P		ESE	ISE	ICA	
BSC	BS-01/ BS-02	Engineering Physics / Engineering Chemistry \$	3	2	4	70	30	25	125
	BS-04	Engineering Mathematics – II	3	2	4	70	30	25	125
ESC	ES-01/ ES-02	Basics of Civil and Mechanical Engineering / Basic Electrical & Electronics Engineering \$	3	2	4	70	30	25	125
		Engineering Graphics and CAD		4	2		25	50	75
SEC	SE-02	Data Analysis and Programming Skills	1	2	2		25	25	50
CC	CC-02	Professional Personality Development (Liberal Learning Course-II)	1	2	2		25	25	50
IKS	IKS-01	Introduction to Indian Knowledge System	2		2		25	25*	50
		Total	13	14	20	210	190	200	600
		Democracy, Elections and Good Governance *	1			50			

***For IKS activity report should be submitted**

BSC- Basic Science Course, ESC- Engineering Science Course, PCC- Programme Core Course ,

AEC- Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses ,

VSEC-Vocational and Skill Enhancement Course

- Legends used–

L	Lecture	FA	Formative Assessment
T	Tutorial	SA	Summative Assessment
P	Lab Session	ESE	End Semester Examination
		ISE	In Semester Evaluation
		ICA	Internal Continuous Assessment

- **Notes-**

1. \$ - Indicates approximately half of the total students at F. Y. will enroll under Group A and the remaining will enroll under Group B.

Group A will take up the course of Engineering Physics (theory & laboratory) in Semester I and will take up the course of Engineering Chemistry (theory & laboratory) in semester II.

Group B will take up the course of Engineering Chemistry (theory & laboratory) in Semester I and will take up the course of Engineering Physics (theory & laboratory) in semester II.

2. # - For the Course (C113) Basic Electrical & Electronics Engineering, Practical's of Basic Electrical Engineering and Basic Electronics Engineering will be conducted in alternate weeks.
3. @ - For the Course (C113) Basics of Civil and Mechanical Engineering, Practical's of Basics of Civil Engineering and Basics of Mechanical Engineering will be conducted in alternate weeks.
4. In Semester Evaluation (ISE) marks shall be based upon the student's performance in a minimum of two tests & mid-term written test conducted & evaluated at the institute level.

Internal Continuous Assessment Marks (ICA) are calculated based on student's performance during laboratory sessions/tutorial sessions.

5. *- Democracy, Elections & Good Governance is a mandatory course. The marks earned by students in this course shall not be considered for the calculation of SGPA/CGPA. However, the student must complete the End Semester Examination (ESE) of 50 marks (as prescribed by the university) for fulfillment of this course. This course is not considered a passing head for counting passing heads for ATKT. However, students must pass this subject for the award of the degree.
6. Students must complete an induction program of a minimum of five days before the commencement of the regular academic schedule in the first semester.

**** GUIDELINES FOR INDUCTION PROGRAM (C119)**

New entrants into an Engineering program come with diverse thoughts, mind set and different social, economic, regional and cultural backgrounds. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

An induction program for the new UG entrant students is proposed at the commencement of the first semester. It is expected to complete this induction program before commencement of the regular academic schedule.

Its purpose is to make new entrants comfortable in their new environment, open them up, set a healthy daily routine for them, create bonding amongst the peers as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The Induction Program shall encompass (but not limited to) below activity –

1. Physical Activities
2. Creative Arts
3. Exposure to Universal Human Values
4. Literary Activities
5. Proficiency Modules
6. Lectures by Experts / Eminent Persons
7. Visit to Local Establishments like Hospital /Orphanage
8. Familiarization to Department

Induction Program Course do not have any marks or credits however performance of students for Induction Program is assessed at institute level using below mandatory criteria –

1. Attendance and active participation
2. Report writing



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Faculty of Engineering & Technology

NEP 2020 Compliant Curriculum

W.E.F. 2024-25

Semester III

Distribution	Course Code	Theory Course Name	Hrs./week			Credits	Examination Scheme				
			L	T	P		ESE	ISE	ICA	OE/POE	Total
PCC	EEPCC-01	Analog Electronics	3			03	70	30			100
PCC	EEPCC-02	Power Plant Engineering and Elements of Power System	3			03	70	30			100
PCC	EEPCC-03	DC Machines and Transformer	3		2	04	70	30	25	25	150
CEP/FP	EEFP-01	Laboratory on Power Plant Engineering and Elements of Power System			2	01			25	25	50
CEP/FP	EEFP-02	Electrical Workshop			2	01			25	25	50
Entrepreneurship	EM-01	Product Development & Entrepreneurship	1	1		02		50	25		75
OE	OE-01	Open Elective -I	2		2	03	70	30	25		125
MDM	MDM-01	Multidisciplinary Minor -I	2		2	03	70	30	25		125
VEC	VEC-01	Universal Human Values	1		2	02	50*		25		75
		Total	15	1	12	22	400	200	175	75	850
	VEC-01	Environmental Science	1								

***For VEC-01(Universal Human Values) MCQ-based examination to be conducted. The red colour indicates activities that are connected with other programs**

PCC- Programme Core Course, PEC-Programme Elective Course, AEC - Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses, VSEC-Vocational and Skill Enhancement Course, FP- Field Project/ CEP – Community Engagement Program
MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.



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W.E.F. 2024-25

Semester IV

Distribution	Course Code	Theory Course Name	Hrs./week			Credits	Examination Scheme				
			L	T	P		ESE	ISE	ICA	OE/POE	Total
PCC	EEPCC-04	Electrical Transmission and Distribution	3			03	70	30			100
PCC	EEPCC-05	Network Analysis	2		2	03	70	30	25		125
PCC	EEPCC-06	AC Machines	3		2	04	70	30	25	25	150
SEC	EESEC-01	Computer Aided Design and Simulation	1		2	02			25	25	50
Economics/ Managements	EM-02	Project management economics	2			02		25	25		50
OE	OE-02	Open Elective -II	2		2	03	70	30	25		125
MDM	MDM-02	Multidisciplinary Minor -II	2		2	03	70	30	25		125
VEC	VEC-02	Professional Ethics	1		2	02	50*		25		75
	Total		16		12	22	400	175	175	50	800
	Environmental Science		1				40	10			50

VEC-02 (Professional Ethics) Examination will be MCQ based

SEC- Skill Enhancement Course, PCC- Programme Core Course, VSEC-Vocational and Skill Enhancement Course

AEC- Ability Enhancement Course, EM Economic/ Managements, CC- Co-curricular Courses,

MDM-Multidisciplinary Minor: It should from other UG Engineering Minor Programme..



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W.E.F. 2025-26

Semester V

Distribution	Course Code	Name of the Course	Engagement Hours			Credits	FA	SA			Total
			L	T	P		ESE	ISE	ICA	OE/ POE	
PCC	EEPCC-07	Electromagnetic Engineering	3			03	70	30			100
PCC	EEPCC-08	Power System Analysis	3		2	04	70	30	25		125
PCC	EEPCC-09	Linear Control System	3		2	04	70	30	25	25	150
PEC	EEPEC-01	Programme Elective Course-I	3		2	04	70	30	25		125
AEC	AEC-02	Creativity and Design Thinking	1		2	02	50*		25		75
OE	OE-03	Interdisciplinary Mini Project	1		2	02			25	25	50
MD M	MDM-03	MD Minor-III	2		2	03	70	30	25		125
		Total	16		12	22	400	150	150	50	750

* MCQ examinations

PEC- Program Elective Course, PCC- Programme Core Course, VSEC-Vocational and Skill Enhancement Course

AEC- Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses,

MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.



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W.E.F. 2025-26

Semester VI

Distribution	Course Code	Name of the Course	Engagement Hours			Credits	FA	SA			Total
			L	T	P		ESE	ISE	ICA	OE/POE	
PCC	EEPCC-10	Electric Traction & Utilization	2			02	70	30			100
PCC	EEPCC-11	Power Electronics & Industrial Drives	3		2	04	70	30	25	25	150
PCC	EEPCC-12	Advanced Control System	2		2	03	70	30	25		125
PEC	EEPEC-02	Program Elective Course-II	3		2	04	70	30	25	25	150
PEC	EEPEC-03	Program Elective Course-III	3	01		04	70	30	25		125
SEC	SEC-04	Mini Project on Industrial Applications			4	02			25	50	75
MDM	MDM-04	Multidisciplinary Minor-IV	2		2	03	70	30	25		125
		Total	15	01	12	22	420	180	150	100	850

PEC- Program Elective Course, PCC- Programme Core Course, SEC- Skill Enhancement Course
 AEC- Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses,
 MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.



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W.E.F. 2026-27

Semester VII

Distribution	Course Code	Name of the Course	Engagement Hours			Credits	FA	SA			Total
			L	T	P		ESE	ISE	ICA	OE/POE	
PCC	EEPCC-13	Power Quality & FACTS	3			03	70	30			100
PCC	EEPCC-14	Switchgear & Protection	2		2	03	70	30	25		125
PEC	EEPEC-04	Programme Elective Course – IV or MOOCS	##4			04	100				100
Project	Project	Capstone Project			8*	04			100	100	200
RM	RM	Research Methodology and IPR	3		2	04	70	30	25		125
MD M	MDM-05	Multidisciplinary Minor-V	2			02	70	30			100
		Total	14		12	20	350	150	175	125	800

Students should attend MOOCS in that 4 Hrs. * Academic Load based on project groups
 PEC- Program Elective Course, PCC- Programme Core Course, SEC- Skill Enhancement Course
 AEC- Ability Enhancement Course, IKS- Indian Knowledge System, CC- Co-curricular Courses,
 MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor Programme.



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W.E.F. 2026-27

Semester VIII

Distribution	Course Code	Name of the Course	Engagement Hours			Credits	FA	SA			Total
			L	T	P		ESE	ISE	ICA	OE/POE	
PCC	PCC-15	Electrical Energy Audit and Management	4#			04	100				100
PEC	PEC-05	Programme Elective Course –V or MOOCS	4#			04	100				100
OJT	OJT	On-Job Training			24	12			200	100	300
		Total	8		24	20	200		200	100	500

Self-learning Technical # Students will practice or attend in Self-Learning mode. *List of MOOC Courses related to Electrical PEC-04 & 05 will be provided by BOS time to time

BSC- Basic Science Course

ESC- Engineering Science Course,

PCC- Programme Core Course,

AEC- Ability Enhancement Course

IKS- Indian Knowledge System,

CC- Co-curricular Courses,

VSEC-Vocational and Skill Enhancement Course

Basket of Programme Elective Course (PEC)

PEC/Sem	Course code and name
EEPEC - 01/ V	EEPEC – 01A: Advanced Microcontroller Systems EEPEC – 01B: Advanced Electrical Machines EEPEC – 01C: Hybrid Electrical Vehicle Design
EEPEC - 02/ VI	EEPEC – 02A: Power System Operation and Control EEPEC – 02B: Electrical Machine Design EEPEC – 02C: Programmable Logic Control and SCADA
EEPEC - 03/ VI	EEPEC – 03A: Smart Grid Technology EEPEC – 03B Extra High Voltage AC Transmission EEPEC – 03C Energy Storage System EEPEC – 03D: Signal & System
EEPEC - 04/ VII OR	EEPEC – 04A: Electrical Estimation, Installation, and Testing EEPEC – 04B Mechatronics EEPEC – 04C: Neural Networks & Fuzzy Logic Control EEPEC – 04D: Digital Signal Processing
EEPEC - 04/ VII	MOOC Courses (As per the list provided by BOS)
EEPEC - 05/ VIII OR EEPEC - 05/ VIII	EEPEC – 05A: High Voltage Engineering EEPEC – 05B: Instrumentation Process Control & Robotics EEPEC – 05C: Advanced Applications in Solar Energy Technology MOOC Courses

Please identify two to three course baskets as above which students will opt for semester-wise PECs to develop expertise in the specific area.

A) Multidisciplinary Minor (MDM) in “Sustainable Energy System “

Semester	Course Code	Course Title
III	EEMDM-01A	Electrical Technology
IV	EEMDM-02A	Advanced Application in renewable Energy
V	EEMDM-03A	Electrical Installation and Utilization
VI	EEMDM-04A	Energy Audit, Conservation Economics and Policy
VII	EEMDM-05A	Energy Storage Systems

Multidisciplinary Minors are for the students of Other Program

B) Multidisciplinary Minor (MDM) in “Electric Vehicle Systems”

Semester	Course Code	Course Title
III	EEMDM-01B	Basics of Electric Vehicle
IV	EEMDM-02B	Electrical Vehicle Motors
V	EEMDM-03B	Electric Vehicle Controls
VI	EEMDM-04B	Electric Vehicle Battery Systems
VII	EEMDM-05B	AI & Cloud Computing in Electric Vehicle

Multidisciplinary Minors are for the students of Other Program

A. Honors in Electrical Vehicle

Semester	Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
			L	T	P		ESE	ISE	ICA	
III	EEHn-01A	Electric Vehicle Technology	3		2	4	70	30	25	125
IV	EEHn-02A	Electric Motors and Controls for Electric Vehicle	3	1		4	70	30	25	125
V	EEHn-03A	Energy Management System for Electric Vehicle	3		2	4	70	30	25	125
VI	EEHn-04A	Testing And Certification of Electric and Hybrid Vehicles	3		2	4	70	30	25	125
VII	EEHn-05A	Mini Project			4*	2			50	50
		Total	12	1	10	18	280	120	150	550

* Indicates Contact Hours

Honors Course will be for the students of same Program

B. Honors in Sustainable Power System

Semester	Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
			L	T	P		ESE	ISE	ICA	
III	EEHn-01B	Advanced and Sustainable Energy Sources	3		2	4	70	30	25	125
IV	EEHn-02B	Smart Energy Management System	3	1		4	70	30	25	125
V	EEHn-03B	Distributed Energy Integration	3		2	4	70	30	25	125
VI	EEHn-04B	AI Applications to Power Systems Management	3		2	4	70	30	25	125
VII	EEHn-05B	Mini Project			4*	2			50	50
		Total	12	1	10	18	280	120	150	550

*Indicates Contact Hours

Honors Course will be for the students of same Program

Honors with Research

<i>Semester</i>	<i>Course Code</i>	<i>Name of the Course</i>	<i>Engagement Hours</i>	<i>Credits</i>	<i>SA</i>		<i>Total</i>
			<i>P</i>		<i>ICA</i>	<i>OE</i>	
VII	EERES-01	Research Project Phase-01	9 #	9	100	100	200
VIII	EERES-01	Research Project Phase-02	9 ##	9	100	100	200
Total			18	18	200	200	400

Along with 9 hours of engagement hours, 4.5 Hrs. activities for preparation for community engagement and service, preparation of reports, etc.

Along with 9 hours of engagement hours 4.5 Hrs. activities for preparation for community engagement and service, preparation of reports, etc. and independent reading during Project Phase 2 and preferably related to Project Phase 2 activities.

These Courses are open for students of all the UG Engineering Program. However, Paper setting and evaluation responsibilities are assigned as follows:

Sr. No.	List of Open Electives	Responsible BOS	Semester III
1.	OE-01A: Advanced Mathematics and Statistics	General Engineering	
2.	OE-01B Digital Marketing and E-Commerce	Mechanical Engineering	
3.	OE-01C Humanities and Social Sciences	General Engineering	
4.	OE-01D Industrial and Quality Management	Mechanical Engineering	
5.	OE-01E Mathematics for Software and Hardware Applications	Electrical Engineering	
6.	OE-01F Soft Skills and Personality Development	General Engineering	

Sr. No.	List of Open Electives	Responsible BOS	
1.	OE-02A Entrepreneurship and Innovation	Civil Engineering	
2.	OE-02B Environmental Sustainability	Civil Engineering	
3.	OE-02C Renewable Energy	Civil Engineering	
4.	OE-02D Measurement, Instrumentation & Sensors	Electrical Engineering	
5.	OE-02 E Operation Research	Mechanical Engineering	
6.	OE-02F Computational Mathematics	General Engineering	
7.	OE-02 G Professional Business Communication	General Engineering	

List of Open Electives 01 (Semester –III)

1. **OE-01A: Advanced Mathematics and Statistics**
2. **OE-01B Digital Marketing and E-Commerce**
3. **OE-01C Humanities and Social Sciences**
4. **OE-01D Industrial and Quality Management**
5. **OE-01E Mathematics for Software and Hardware Applications**
6. **OE-01F Soft Skills and Personality Development**

List of Open Electives 02 (Semester –IV)

1. **OE-02A Entrepreneurship and Innovation**
2. **OE-02B Environmental Sustainability**
3. **OE-02C Renewable Energy**
4. **OE-02D Measurement, Instrumentation and Sensors**
5. **OE-02E Operation Research**
6. **OE-02F Computational Mathematics**
7. **OE-02G Professional Business Communication**

Open Electives 03 (Semester –V)

1. **Interdisciplinary Mini Project**