



Sant Gadge Baba Amravati University, Amravati

*Scheme of Implementation for
Four Year Undergraduate Degree Programme in
Engineering and Technology*

B.E. ELECTRICAL ENGINEERING

*In the faculty of
Science and Technology*

ACADEMIC EVALUATION SCHEME/CREDIT SYSTEM

Year: 2024-25

(Scheme of Teaching, Learning, Examination & Evaluation w.e.f. 2024-2025 and onwards)

Scheme for First Year - Four Year Undergraduate Engineering Degree Programme
Semester -I – [Common for all branches]

SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)
			L	P	T	Hrs.		External		Internal				External		Internal				
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks			
	Core Courses																			
1	Applied Mathematics -I	1AL100BS	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
2	Engineering Physics	1AL101BS	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
3	Computer Programming	1AL102ES	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
4	Engineering Mechanics	1AL103ES	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
	Laboratory Courses																			
5	Engineering Physics Lab	1AL104BS	0	2	0	2	1							25	10	25	10	50	25	
6	Computer Programming Lab	1AL105ES	0	2	0	2	1							25	10	25	10	50	25	
7	Engineering Mechanics Lab	1AL106ES	0	2	0	2	1							25	10	25	10	50	25	
8	Engineering Workshop	1AL107ES	0	2	0	2	1							25	10	25	10	50	25	
	Vocational and Skill Enhancement Courses (VSEC)																			
9	Electrical workshop	1EE108VS	1	2	0	3	2									50	25	50	25	
	Ability Enhancement Courses (ACE)																			
10	Professional Communication	1AL109AE	1	2	0	3	2							25	10	25	10	50	25	
	Co-curricular course (CC)																			
11	Co-curricular Course	1AL110CC	0	4	0	4	2									50	25	50	25	
	TOTAL		14	16	0	30	22					400						350		

Note: Six hours per week are allotted for continuous evaluation process for the above subjects. (Total contact hours per week=34Hours)

Scheme for First Year - Four Year Undergraduate Engineering Degree Programme Semester -II – [Common for all branches]																					
SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)	
			L	P	T	Hrs.		External		Internal				External		Internal					
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
	Core Courses																				
1	Applied Mathematics -II	2AL111BS	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
2	Engineering Chemistry	2AL112BS	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
3	Basic Electrical Engineering	2AL113ES	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
4	Engineering Graphics	2AL114ES	2	0	0	2	2	60	18	40	12	100	40							3.00 Hrs.	
	Laboratory Courses																				
5	Engineering Chemistry Lab	2AL115BS	0	2	0	2	1							25	10	25	10	50	25		
6	Basic Electrical Engineering Lab	2AL116ES	0	2	0	2	1							25	10	25	10	50	25		
7	Engineering Graphics Lab	2AL117ES	0	2	0	2	1							25	10	25	10	50	25		
	Vocational and Skill Enhancement Courses (VSEC)																				
8	Electronics Workshop	2EE118VS	1	2	0	3	2									50	25	50	25		
	Programme Core Course (PCC)																				
9	Generation of Electrical Energy	2EE119PC	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.	
	Indian Knowledge System (IKS)																				
10	Indian Traditional Knowledge	2AL120IK	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.	
	Co-curricular Course (CC)																				
11	Co-curricular Course	2AL121CC	0	4	0	4	2									50	25	50	25		
	TOTAL		16	12	0	28	22					500						250			

Note: Six hours per week are allotted for continuous evaluation process for the above subjects. (Total contact hours per week=34Hours)

Scheme for Multiple Entry and Exit

Exit option 1 (L4.5): Award of UG Certificate in Major with 44 credits and an additional 8 credits.				
Exit Courses				
1	3EE241EC	Electrification of building	Work based vocational courses/training during summer vacation. (Minimum 4 Week/course)	4
2	3EE242EC	Repairing and maintenance of domestic Appliances		4
OR				
3	3EE404EL	Internship / Apprenticeship	During summer vacation (Minimum 8 Week)	8

Scheme for Second Year - Four Year UG Engineering Degree Programme B. E. Electrical Engineering (Semester-III)																				
SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)
			L	P	T	Hrs.		External		Internal				External		Internal				
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks			
	Core Courses																			
1	Electronics Components & Circuits	3EE200PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
2	Electrical Circuit Analysis	3EE201PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
3	Electrical Measurements and Instrumentation	3EE202PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
	Laboratory Courses																			
4	Community Engagement Project/ Fieldproject (related to Major)	3EE400EL	0	4	0	4	2							25	10	25	10	50	25	
5	Electrical Circuit Analysis Lab	3EE203PC	0	2	0	2	1							25	10	25	10	50	25	
6	Electrical Measurements and Instrumentation Lab	3EE204PC	0	2	0	2	1							25	10	25	10	50	25	
	Multi-Disciplinary Minor (MDM)																			
7	Electrical Energy Generation	3EE205MD	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
	Open Elective other than a particular Program																			
8	Open Elective I	3EE206OE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
	HSSMC (Entrepreneurship/ Economics/ Management Course)																			
9	Entrepreneurship Development	3EE207EM	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
	Value Education Course (VEC)																			
10	Environmental Science	3AL208VE	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
	TOTAL		18	08	0	26	22					550						150		

Open Elective I: 1.Power Supply System (3EE206OE1), 2.Energy Generation & Utilization (3EE206OE2)

Note:Six hours per week are allotted for continuous evaluation process for the above subjects.(Total contact hours per week=34Hours)

Scheme for Second Year - Four Year UG Engineering Degree Programme B. E. Electrical Engineering (Semester-IV)																					
SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)	
			L	P	T	Hrs.		External		Internal				External		Internal					
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
	Core Courses																				
1	Electrical Machines – I	4EE209PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
2	Control System	4EE210PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
3	Electromagnetic Fields	4EE211PC	2	0	0	2	2	60	18	40	12	100	40							3.00 Hrs.	
	Laboratory Courses																				
4	Electrical Machines - I lab	4EE212PC	0	2	0	2	1							25	10	25	10	50	25		
5	Control System Lab	4EE213PC	0	2	0	2	1							25	10	25	10	50	25		
	Multi-Disciplinary Minor (MDM)																				
6	Electrical Measurements	4EE214MD	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs	
	Vocational & Skill Enhancement Courses (VSEC)																				
7	Electrical Software Lab	4EE215VS	1	2	0	3	2									50	25	50	25		
	Open Elective other than a particular Program																				
8	Open Elective II	4EE216OE	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.	
	HSSMC (Entrepreneurship/ Economics/ Management Course)																				
9	Engineering Economics	4EE217EM	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.	
	Ability Enhancement Courses (AEC)																				
10	Modern Indian Language	4AL218AE	2	0	0	2	2							25	10	25	10	50	25		
	Value Education Course (VEC)																				
11	Universal Human Values	4AL219VE	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.	
	TOTAL		19	06	0	25	22					500						200			

Open Elective II: 1.Electrical Drives (4EE216OE1), 2.Electrical Machines (4EE216OE2)

Note:Six hours per week are allotted for continuous evaluation process for the above subjects.(Total contact hours per week=34Hours)

Scheme for Multiple Entry and Exit

Exit option 2 (L5.0): Award of UG Diploma in Major with 88 credits and an additional 8 credits				
Exit Courses				
1	5EE243EC	Electrical Panel Design and Implementation	Work based vocational courses/training during summer vacation. (Minimum 4 Week/course)	4
2	5EE244EC	Repairing and maintenance of Electrical Machines		4
OR				
3	5EE405EL	Internship / Apprenticeship	During Summer Vacation (Minimum 8 Week)	8

Scheme for Third Year - Four Year UG Engineering Degree Programme
B. E. Electrical Engineering
(Semester-V)

SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)
			L	P	T	Hrs.		External		Internal				External		Internal				
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks			
	Core Courses																			
1	Power Electronics	5EE221PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
2	Electrical Machines – II	5EE222PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
3	Power System – I	5EE223PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
4	Program Elective Course – I	5EE224PE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
	Laboratory Courses																			
5	Power Electronics Lab	5EE225PC	0	2	0	2	1							25	10	25	10	50	25	
6	Electrical Machines – II Lab	5EE226PC	0	2	0	2	1							25	10	25	10	50	25	
7	Power System – I Lab	5EE227PC	0	2	0	2	1							25	10	25	10	50	25	
	Multi-Disciplinary Minor (MDM)																			
8	DC Machine	5EE228MD	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
9	AC Machine	5EE229MD	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
10	Electrical Machines Lab	5EE230MD	0	2	0	2	1							25	10	25	10	50	25	
	Open Elective other than a particular Program																			
11	Open Elective III	5EE231OE	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
	TOTAL		18	08	0	26	22					550						200		

Program Elective Course- I: 1. Advanced Control System (5EE224PE1) 2. Industrial Automation (5EE224PE2), 3. Process Control System (5EE224PE3)

Open Elective III: 1. Energy Audit & Management (5EE231OE1), 2. Electrical Estimation & Costing (5EE231OE2)

Note: Six hours per week are allotted for continuous evaluation process for the above subjects. (Total contact hours per week = 34 Hours)

Scheme for Third Year - Four Year UG Engineering Degree Programme
B. E. Electrical Engineering
(Semester-VI)

SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)	
			L	P	T	Hrs.		External		Internal				External		Internal					
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
	Core Courses																				
1	Computer Aided Machine Design	6EE232PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
2	Microprocessor & Microcontroller	6EE233PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
3	Power System – II	6EE234PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
4	Program Elective Course-II	6EE235PE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
5	Program Elective Course-III	6EE236PE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.	
	Laboratory Courses																				
6	Computer Aided Machine Design Lab	6EE237PC	0	2	0	2	1							25	10	25	10	50	25		
7	Microprocessor & Microcontroller Lab	6EE238PC	0	2	0	2	1							25	10	25	10	50	25		
8	Power System – II Lab	6EE239PC	0	2	0	2	1							25	10	25	10	50	25		
	Multi-Disciplinary Minor (MDM)																				
9	Basic Power System	6EE240MD	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.	
	Vocational and Skill Enhancement Courses																				
10	PLC & Industrial Automation Lab	6EE241VS	1	2	0	3	2									50	25	50	25		
	TOTAL		18	08	0	26	22					550						200			

Program Elective Course-II: 1. Electrical Energy Distribution & Utilization (6EE234PE1), 2. Electrical Distribution & Substation Automation (6EE234PE2) ,3. Electrical Estimation & Costing (6EE234PE3)

Program Elective Course-III: 1.Numerical Methods & Optimization Techniques (6EE235PE1), 2. Generalized Machine Theory (6EE235PE2),3.Electrical Drives & Control (6EE235PE3)

Note:Six hours per week are allotted for continuous evaluation process for the above subjects.(Total contact hours per week=34Hours)

Scheme for Multiple Entry and Exit

Exit option 3 (L5.5): Award of UG Degree in Major with 132 credits and an additional 8 credits				
Exit Courses				
1	7EE310EC	Industrial Electrical systems installation and maintenance	Work based vocational courses/training during summer vacation. (Minimum 4 Week/course)	4
2	7EE311EC	PCB Design and Circuit Simulation		4
OR				
3	7EE406EL	Internship / Apprenticeship	During Summer vacation (Minimum 8 week)	8

Scheme for Fourth Year - Four Year UG Engineering Degree Programme
B. E. Electrical Engineering
(Semester-VII)

SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)
			L	P	T	Hrs.		External		Internal				External		Internal				
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks			
	Core Courses																			
1	Power System Protection	7EE300PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
2	Digital Signal Processing	7EE301PC	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
3	Program Elective Course-IV	7EE302PE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
4	Program Elective Course-V	7EE303PE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
5	Program Elective Course-VI	7EE304PE	3	0	0	3	3	60	18	40	12	100	40							3.00 Hrs.
	Laboratory Courses																			
6	Power System Protection lab	7EE305PC	0	2	0	2	1							25	10	25	10	50	25	
7	Digital Signal Processing lab	7EE306PC	0	2	0	2	1							25	10	25	10	50	25	
	Multi-Disciplinary Minor (MDM)																			
8	Energy Audit & Management	7EE307MD	2	0	0	2	2	30	09	20	06	50	20							2.00 Hrs.
9	Power System Lab	7EE308MD	0	2	0	2	1							25	10	25	10	50	25	
	Project																			
10	Project	7EE401PR	0	4	0	4	2									100	50	100	50	
	TOTAL		17	10	0	27	22					550						250		

Program Elective Course-IV: 1. Power System Operation & Control (7EE302PE1),2. Smart Grid Technology (7EE302PE2),3. Energy Audit & Management (7EE302PE3)

Program Elective Course-V: 1. Power Quality & Mitigation Techniques (7EE303PE1),2. High Voltage Engineering (7EE303PE2),3. HVDC & FACTS (7EE303PE3)

Program Elective Course-VI: 1.Computer Methods in Power System Analysis(7EE304PE1),2. Artificial Intelligence (7EE304PE2),3. Electric & Hybrid Vehicle (7EE304PE3)

Note:Six hours per week are allotted for continuous evaluation process for the above subjects.(Total contact hours per week=34Hours)

Scheme for Fourth Year - Four Year UG Engineering Degree Programme B. E. Electrical Engineering (Semester-VIII)																				
SN	Course Name	Code	Course Plan per Week (Hrs.)				Credits	Theory Evaluation				Theory (Total)		Practical Evaluation				Practical (Total)		ESE Time (Hours)
			L	P	T	Hrs.		External		Internal				External		Internal				
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks			
	Core Courses																			
1	Research Methodology	8EE309RM	4*	0	0	4	4	60	18	40	12	100	40							3.00 Hrs.
2	Industry Internship	8EE402EL	0	24	0	24	12							200	80	100	40	300	150	
3	Project	8EE403PR	0	4	0	4	2							50	20	50	20	100	50	
	TOTAL		04	28	0	32	18					100						400		

L: Lecture P: Practical T : Tutorial ESE: End Semester Exam IE: Internal Evaluation INT: Internal EXT: External

*** The course on Research Methodology is supposed to be completed by the student in Online mode (Swayam, MOOC's, any other platform approved by AICTE OR on the LMS platform offered by the Institute).**

B.E.ELECTRICAL ENGINEERING
Multi-Disciplinary Minors (14Credits)

SEM	CourseCode	CourseType	Credit		CourseTitle
			T	P	
Sem III	3EE205MD	MDM-I	2	0	Electrical Energy Generation
Sem IV	4EE214MD	MDM-II	2	0	Electrical Measurements
Sem V	5EE227MD	MDM-III	2	0	DC Machines
	5EE228MD	MDM-IV	2	0	AC Machines
	5EE229MD	MDM Lab.-I	0	1	Electrical Machines Lab
Sem VI	6EE239MD	MDM-V	2	0	Basic Power System
Sem VII	7EE307MD	MDM-VI	2	0	Energy Audit & Management
	7EE308MD	MDM Lab.-II	0	1	Power System Lab
			12	02	
		Total	14		

PROGRAM ELECTIVE COURSE				
SEMESTER		CODE	TITLE	CREDIT
V	PEC I	5EE223PE1	Advanced Control System	03
		5EE223PE2	Industrial Automation	03
		5EE223PE3	Process Control System	03
VI	PEC II	6EE234PE 1	Electrical Energy Distribution & Utilization	03
		6EE234PE 2	Electrical Distribution & Substation Automation	03
		6EE234PE 3	Electrical Estimation & Costing	03
	PEC III	6EE235PE1	Electrical Machine Design	03
		6EE235PE2	Generalized Machine Theory	03
		6EE235PE3	Electrical Drives & Control	03
VII	PEC IV	7EE302PE1	. Power Quality & Mitigation Techniques	03
		7EE302PE2	Smart Grid Technology	03
		7EE302PE3	Energy Audit & Management	03
	PEC V	7EE303PE1	Power Quality & Mitigation Techniques	03
		7EE303PE2	High Voltage Engineering	03
		7EE303PE3	HVDC & FACTS	03
	PEC VI	7EE304PE1	Computer Methods in Power System Analysis	03
		7EE304PE2	Artificial Intelligence	03
		7EE304PE3	Electric & Hybrid Vehicle	03

OPEN ELECTIVE COURSE				
SEMESTER		CODE	TITLE	CREDIT
III	OE I	3EE206OE1	PowerSupply System	03
		3EE206OE2	Energy Generation & Utilization	03
IV	OE II	4EE216OE1	Electrical Drives	02
		4EE216OE2	Electrical Machines	02
V	OE III	5EE230OE1	Energy Audit &Management	02
		5EE230OE2	Electrical Estimation &Costing	02

Multidisciplinary Double Minor (Specialization), Honors and Honors with Research in Electrical Engineering / Electrical (Electronics & Power) Engineering

1. Double Minor (Multidisciplinary and Specialization Minor)

Under Bachelor's Engineering / Technology Degree in chosen Major Engineering / Technology Discipline with Double Minor (Multidisciplinary and Specialization Minor, 180-194 credits), students would take up five-six additional courses of 18 credits in another Engineering / Technology discipline/ Emerging Areas Specialization distributed over semesters III to VIII.

2. Honors Degree

The Bachelor's Engineering / Technology Honors Degree in chosen Major Engineering / Technology Discipline with Multidisciplinary Minor (180-194 credits) enables students to take up five-six additional courses in the **same** Engineering. / Tech. discipline of 18 credits distributed over semesters III to VIII.

3. Honors with Research

For BE Honors with Research in Electrical Engineering / Electrical (Electronics & Power) Engineering students need to complete a **Research Project** (on **Individual basis**) of **18 credits** in VII (7EP408HR) & VIII (EP409HR) semester.

***Eligibility for admission to the UG Bachelor's Degree with Double Minor/ Honors /Research as per UGC guidelines:**

Minimum CGPA/CPI of **7.5 or minimum 75%** after **second semester** for UG Bachelor's Degree with **Double Minor/Honors'** and Minimum CGPA/CPI of **7.5 or minimum 75%** after **sixth semester** for UG Bachelor's Degree with Research

Subject Tracks for Multidisciplinary Double Minor (Specialization) and Honors in Electrical Engineering / Electrical (Electronics & Power) Engineering

Track 1: E-Mobility

Semester	Sem III	Sem IV	Sem V	Sem VI	Sem VII
Subject	Electric Vehicle System and Architecture	Battery Management Systems	Vehicle Powertrain and Drive Systems	EV Charging Infrastructure and Smart Grids	Mini-project/ Industry training on EV for minimum duration of 2 weeks.
Code	3EE245DH1	4EE246DH1	5EE247DH1	3EE24DH1	7EE407DH1
Credits	04	04	04	04	02
Total Credits	18				

Track 2: Power System

Semester	Sem III	Sem IV	Sem V	Sem VI	Sem VII
Subject	Power System Restructuring	Advanced DC – AC Power Conversion	Grid Integration of Renewable Energy	Economic Evaluation of Power Projects	Mini-project/ Industry training on Power system for minimum duration of 2 weeks.
Code	3EE245DH2	4EE246DH2	5EE247DH2	3EE24DH2	7EE407DH2
Credits	04	04	04	04	02
Total Credits	18				

Nomenclature:

Acronym	Course/Subject Vertical
BS	Basic Science Course
ES	Engineering Science Course
EL	Experiential Learning
PC	Program Course
PE	Program Elective Course
MD	Multidisciplinary Minor Course
OE	Open Elective
VS	Vocational Skill Enhancement Course
AE	Ability Enhancement Course
EM	Entrepreneurship/Economics/Management Course
IK	Indian Knowledge System
VE	Value Education Course
RM	Research Methodology
FP	Field Project
PR	Project
CC	Co-curricular Course
EC	Exit Course
HR	Honors' with Research
DH	Double Minor/ Honors