SHIVAJI UNIVERSITY, KOLHAPUR
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शिवाजी विद्यापीठ, कोल्हापूर ४१६ ००४, महाराष्ट्र
दूरध्वनी - इपीबीएक्स - २०६०९०००, अभ्यासमंडळे विभाग : ०२३१- २६०९०९४, २६०९४८७
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Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

SU/BOS/Sci & Tech/ 315 **Date: 16/05/2025**

To,

The Principal / Director,
All Concerned Affiliated Colleges / Institutions,
Shivaji University, Kolhapur.

Subject: Regarding revised syllabus of **B. Tech. Part - II (Sem– III - IV)** degree **Programme (Affiliated College)** under the Faculty of Science and Technology as per NEP 2020.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, Nature of Question paper and equivalence of B. Tech. Part - II (Sem - III & IV) under the Faculty of Science & Technology as per NEP 2020.

No.	Course Syllabus
1	Civil Engineering
2	Mechanical Engineering
3	Mechanical and Mechatronic Engineering (Additive Manufacturing)
4	Electrical Engineering and Technology
5	Electrical and Computer Engineering
6	Electronics and Telecommunication Engineering
7	Electronics & Computer Science Engineering
8	Computer Science and Engineering
9	Artificial Intelligence & Machine Learning (AIML)
10	Data Science (DS)
11	Artificial Intelligence & Data Science (AIDS)

This Syllabus, shall be implemented from the academic year **2025-26** onwards. A soft copy containing the syllabus is attached herewith and it is available on university website **www.unishivaji.ac.in NEP-2020@suk (Online Syllabus)**

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October/ November 2025 & March / April 2026. These chances are available for repeater students, if any

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dr. S. M. Kubal
Dy. Registrar

Copy to: for Information and necessary action

1	The I/c Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations & Evaluation	7	Affiliation Section (T.1) (T.2)
3	The Chairpersan, Respective Board of Studies	8	P.G.Admission Section, /P.G Seminar Section
4	OE 4 Exam Section,	9	Computer Centre,/IT Cell
5	Eligibility Section,	10	Internal Quality Assorance Cell (IQAC)

Shivaji University
Kolhapur

RevisedSyllabus
as per
NationalEducationPolicy-2020
(NEP-2.0)

S.Y.B.Tech.
ElectricalEngineering

TobeImplementedfrom

AcademicYear2025-26

First Year Exit: Teaching Methodology, Assessment and Evaluation

[I] As per R. R. B. Tech. 12.1 Rule: Award of Degree

If a student passes all the courses of first year and earns the requisite number of credits, the student will become entitled to Undergraduate Certificate (One year or two semesters) in the programme of his/her major subject. If he/she wants to exit, can exit the programme with UG Certificate. However, for the award of one year UG Certificate in Major with 44 credits, an additional 8 credits are required to earn.

[II] First Year Exit Course:

Methodology 1:

1. The students should complete two online certification courses (NPTEL) related to their programme, each of 3 credits. In addition to this, they will also need to complete 2 credits worth of two Virtual Lab work related to online certification courses. These additional 8 credits earn by students shall be based upon skill based vocational courses or internship/Apprenticeship.
2. The NPTEL courses are likely to be available online and can be completed at the student's own pace. The content will be specific to the student's field of study or programme. The skill based vocational courses shall be analogous to the Baskets/Areas provided by the concerned BoS.
3. The student must complete two virtual lab work that adds 2 credits to simulate practical or experimental learning experiences in a controlled virtual environment.

4. **Examination scheme:** The marks gained from the two NPTEL Courses (3 credits each) are converted to a total of 100 marks. The report for the two Virtual Lab work of 2 credits will be evaluated for 25 marks. The report should include a detailed write-up and analysis of the virtual lab experiments conducted, encompassing the methodology, results, and conclusions.
5. There may be uncertainty in availability of the NPTEL courses offered by concerned BoS as there is continuous updatation of the NPTEL courses. The students can choose equivalent NPTEL course of the required duration with prior permission from the concerned institute. The concerned institute should communicate to Concerned BoS for their permission. For NPTEL course registration, the students are required to visit to website https://swayam.gov.in and create their account. Log in the account and join the required course and follow the instructions to compete the course. Similarly, for Virual Lab, the students are required to visit to website https://www.vlab.co.in and create their account. Log in the account and join the required lab and follow the instructions to compete the course (need to perform all listed experiments under that Lab). To fulfill the requirement of 06 credits, students can go for two courses each of 12 weeks.

Methodology 2:

1. The students should complete two online certification courses (NPTEL) related to their programme, each carrying 2 credits. In addition to this, they will also need to complete 4 credits worth of two physical internship/Apprenticeship (each of 40 hrs) work from relevant

industry. These additional 8 credits earned by the students shall be based upon skill based vocational courses or internship/Apprenticeship.

2. The NPTEL courses are likely to be available online and can be completed at the student's own pace. The content will be specific to the student's field of study/programme. The skill-based vocational courses shall be analogous with the list provided by the concerned BoS.
3. The student should complete two physical internship/Apprenticeship (each of 40 hrs) work from relevant industrial practices that adds 4 credits to simulate practical or experimental learning experiences in a controlled virtual environment.
4. **Examination scheme:** The marks gained from the two NPTEL Courses (2 credits each) are converted to a total of 100 marks. The report for the performed two physical internship/Apprenticeship (each of 40 hrs) work from relevant industrial practices of 4 credits will be evaluated for 25 marks. The report should include a detailed write-up and analysis of two physical internship/Apprenticeship (each of 40 hrs) work along with certificate of internship/Apprenticeship from relevant industrial practices conducted, encompassing the methodology, results, and conclusions.
5. There may be uncertainty in availability of the NPTEL courses offered by concerned BoS as there is continuous updatation of the NPTEL courses. The students can choose equivalent NPTEL course of the required duration with prior permission from the concerned institute.

The concerned institute should communicate to Concerned BoS for their permission. For NPTEL course registration, the students are required to visit to website https://swayam.gov.in and create their account. Log in the account and join the required course and follow the instructions to compete the course.

Direct Second Year Entry: Teaching Methodology, Assessment and Evaluation

[I] For the students admitted directly into the second year of a programme (at the entry level) from a different programme, earning of an additional 2 credits is mandatory.

[II] As per R. R. B. Tech. 13.3 Rule, For direct second year admitted students (at entry level) to concern programme, the earning of additional 2 credits is mandatory. It is required to conduct examination and evaluation for same at institute level at the time of third semester ESE examination. The evaluation report must be submitted to The Director, Board of Examination and Evaluation, Shivaji University, Kolhapur.

[III] Examination scheme:

Students admitted directly into the second year of a programme from another programme are required to complete a 2-credit entry-level course as per the prescribed curriculum. This course should be completed at their own pace to ensure alignment with the programme foundational requirements. End Semester Examination (ESE) of 100 marks will be conducted at the institute level. It is mandatory to organize the examination and evaluate the performance of such students at the institute level during the third semester ESE. The evaluation report must be submitted to The Director, Board of Examination and Evaluation, Shivaji University, Kolhapur.

Open Elective Courses: Teaching Methodology, Assessment and Evaluation

Open Elective (OE) courses other than faculty of Science and Technology through Massive Open Online Courses (MOOCs) allowing students to engage with a broad spectrum of ideas and knowledge areas. The OE courses are likely to be available online and can be completed at the student's own pace within a set timeframe. For OE course, students are required to visit to the website https://swayam.gov.in for registration and create an account. Afterward, students should Login the account and join the course assigned by the course coordinator and follow the instructions to compete the course. Minimum 25 students can register for one OE course in the concerned institute. There will be only one course coordinator for one OE course.

1. **For Semester-III,** OE theory course of 3 credits consists of Mid Semester Examination (MSE) of 30 Marks, In Semester Evaluation/Continuous Assessment (ISE/CA) of 10 Marks and End Semester Examination (ESE) of 60 Marks.
2. **For Semester-III,** OE practical lab course of 1 credit consists of In Semester Evaluation/Continuous Assessment (ISE/CA) of 25 Marks and End Semester Examination-Practical Oral Examination (ESE-POE) of 25 Marks. Course Coordinator assigned by Institute should complete the selected course practical through expert of that course.
3. **For Semester-IV,** OE theory course of 2 credits consists of Mid Semester Examination (MSE) of 30 Marks, In Semester

Evaluation/Continuous Assessment (ISE/CA) of 10 Marks and End Semester Examination (ESE) of 60 Marks.

4. The Mid Semester Examination (MSE) of 30 Marks based on selected OE Course will be conducted by Concerned Departmental Course Coordinator. The course expert of concerned faculty should set question paper of MSE and evaluate the same.
5. Online submitted assignments by students using SWAYAM platform for concerned OE course will be used for In Semester Evaluation/Continuous Assessment (ISE/CA) of 10 Marks by Concerned Departmental Course Coordinator appointed for particular course by Principal of the Institute. Assignments may be of varied in nature for OE course.
6. The setting of ESE question paper of Concerned OE Course should be done through course expert of concerned faculty as per University rules and is responsibility of Institute/ Departmental Course Coordinator.
7. Student may get failure in the said OE course or the examination may get delayed by SWAYAM, in either cases, ESE of the said course will be conducted as per the University rules.

Note: One OE course is to be floated by the institute for 60 intake.

Second Year Exit: Teaching Methodology, Assessment and Evaluation

[I] As per R. R. B. Tech. 12.2 Rule: Award of Degree

If a student passes all the courses of first year, second year and earns the requisite number of credits, the student will become entitled to Undergraduate Diploma (Two years or four semesters) in the programme of his/her major subject. If he/she wants to exit, can exit the programme with UG Diploma certificate. However, for the award of two years UG Diploma Certificate in Major with 88 credits, an additional 8 credits from Exit Courses are required to earn.

[II] Second Year Exit Course:

Methodology 1:

1. The students should complete two online certification courses (NPTEL) related to their programme, each of 3 credits. In addition to this, they will also need to complete 2 credits worth of two Virtual Lab work related to online certification courses. These additional 8 credits earn by students shall be based upon skill based vocational courses or internship/Apprenticeship.
2. The NPTEL courses are likely to be available online and can be completed at the student's own pace. The content will be specific to the student's field of study or programme. The skill based vocational courses shall be analogous to the Baskets/Areas provided by the concerned BoS.

3. The student must complete two virtual lab work that adds 2 credits to simulate practical or experimental learning experiences in a controlled virtual environment.
4. **Examination scheme:** The marks gained from the two NPTEL Courses (3 credits each) are converted to a total of 100 marks. The report for the two Virtual Lab work of 2 credits will be evaluated for 25 marks. The report should include a detailed write-up and analysis of the virtual lab experiments conducted, encompassing the methodology, results, and conclusions.
5. There may be uncertainty in availability of the NPTEL courses offered by concerned BoS as there is continuous updatation of the NPTEL courses. The students can choose equivalent NPTEL course of the required duration with prior permission from the concerned institute. The concerned institute should communicate to Concerned BoS for their permission. For NPTEL course registration, the students are required to visit to website https://swayam.gov.in and create their account. Log in the account and join the required course and follow the instructions to compete the course. Similarly, for Virual Lab, the students are required to visit to website https://www.vlab.co.in and create their account. Log in the account and join the required lab and follow the instructions to compete the course (need to perform all listed experiments under that Lab). To fulfill the requirement of 06 credits, students can go for two courses each of 12 weeks.

Methodology 2:

1. The students should complete two online certification courses (NPTEL) related to their programme, each carrying 2 credits. In addition to this, they will also need to complete 4 credits worth of two physical internship/Apprenticeship (each of 40 hrs) work from relevant industry. These additional 8 credits earned by the students shall be based upon skill based vocational courses or internship/Apprenticeship.
2. The NPTEL courses are likely to be available online and can be completed at the student's own pace. The content will be specific to the student's field of study/programme. The skill-based vocational courses shall be analogous with the list provided by the concerned BoS.
3. The student should complete two physical internship/Apprenticeship (each of 40 hrs) work from relevant industrial practices that adds 4 credits to simulate practical or experimental learning experiences in a controlled virtual environment.
4. **Examination scheme:** The marks gained from the two NPTEL Courses (2 credits each) are converted to a total of 100 marks. The report for the performed two physical internship/Apprenticeship (each of 40 hrs) work from relevant industrial practices of 4 credits will be evaluated for 25 marks. The report should include a detailed write-up and analysis of two physical internship/Apprenticeship (each of 40 hrs) work along with certificate of internship/Apprenticeship from

relevant industrial practices conducted, encompassing the methodology, results, and conclusions.

5. There may be uncertainty in availability of the NPTEL courses offered by concerned BoS as there is continuous updatation of the NPTEL courses. The students can choose equivalent NPTEL course of the required duration with prior permission from the concerned institute. The concerned institute should communicate to Concerned BoS for their permission. For NPTEL course registration, the students are required to visit to website https://swayam.gov.in and create their account. Log in the account and join the required course and follow the instructions to compete the course.

DepartmentofElectricalEngineering

ExitCourseforElectricalEngineeringafter1st Year

Exitoption: AwardofUGCertificateinMajorwith44creditsandanadditional8 creditsfromfollowing ExitCourses				
Sr.No	**CourseCode**	**CourseTitle**	**Mode**	**Credits**
1	EE-EC-0301	CertificateCourseinElectricalMaintenanceandElectricalAudit	Analogous Online/offline certificationCourseorindustrial training of total 8 credits	8
		OR		
2	EE-EC-0302	CertificateCourseonElectricityLawsofIndiaandAbroad		8

1. Studentsmayselectmultiplecoursesfromthelistprovidedtofulfilltherequiredcredits.
2. ToenrollinanNPTELcourse,visit https://swayam.gov.in,register,andcreateanaccount.Afterlogging in, jointhedesiredcourseand follow the provided instructions to complete it.
3. Pleasenotethat theavailabilityofNPTELcourses is subject tochangedueto regular updates.If a listedcourseis unavailable, students may opt for an equivalent course ofsimilar duration and subject matter, with prior approval fromthe concerned institute.
4. Ifastudent isunabletocompletetheNPTEL/MOOConlinecourse,theyarerequiredtoappear for aComputer-BasedExamination(MCQand MSQ format) conducted byShivaji University, based onthe content of the NPTEL/MOOC course selected bythe student.

Examinationschemeforfirst yearexit:

- ThemarksobtainedfromtheMOOCswill bescaledtoatotalof100marks.

ListofNPTEL/MOOCs Course

CertificateCourseinElectricalMaintenanceandElectricalAudit andCertificateCourseonElectricity LawsofIndiaandAbroad

Sr.No.	NPTELCourseTitle	Duration	Credits
01	EnergyConservationandAuditLaboratory	08weeks	02
02	ConditionMonitoringandMaintenanceManagement	08weeks	02
03	RenewableEnergyPowerPlants Laboratory	08weeks	02
04	BasicPrinciplesofEnergyManagement&EnergyAudit	12weeks	04
05	Electricity&SafetyMeasures	12weeks	04

Earningofadditional2mandatorycreditsfordirectsecond yearadmittedstudentstoElectricalEngineeringbranch.

Sr.No.	Semester	Subject	Credit
1	III	GeneralElectricalEngineering	2

ShivajiUniversity,Kolhapur

SecondYear(Sem.–III) B.Tech.ElectricalEngineering

GeneralElectricalEngineering

TeachingScheme			ExaminationScheme	
Lectures	2Hrs./week		MSE	30Marks
Tutorials	00 Hrs./week		ISE	10Marks
TotalCredits	02		ESE	60Marks
			DurationofESE	02 Hrs.30Min

Prerequisite:

CourseOutcomes(CO): Attheendofsuccessfulcompletionofthecourse,thestudentwill be

CO1	Explainthebasicelectricand magneticcircuits.
CO2	Interpretthefundamentalsofsingle-phasealternatingquantities.
CO3	Examinerelationbetweenlineandphasequantitiesforthreephase connection.
CO4	Explaintheworkingprincipleoftransformer and calculate theefficiency.

Units	CourseContents	CO	Hours
Unit1	**D.C.circuits&Magnetic Circuit:** Concept ofE.M.F, PotentialDifference, Current, Resistance, Ohm‟s Law,Kirchhoff‟s laws, Concept of mmf, reluctance,magneticflux,MagneticFluxdensity,Magneticfieldstrength,BHcurve,magneticleakage, ComparisonofElectricandMagnetic circuit.	**CO1**	**08**
Unit2	**SinglephaseAC Circuits** Fundamentals of Alternating quantities,Faraday'sLaw,Types of Induced E.M.F,Generation of sinusoidal voltage, concept of R.M.S. & Average value, form factor, Peak Factor, powers, power factor.	**CO2**	**07**
Unit3	**ThreephaseA.C. Circuits** Advantagesof3phasesystem,Generationof3phaseACsupply,balanced3phase load,relationbetweenline and phase quantities for star connected circuit and delta connected circuit.	**CO3**	**07**
Unit4	**Transformer:**SinglephaseTransformer:Construction,OperatingPrinciple,TypesandApplications,EMF Equation,RatiosofVoltageandCurrent,Losses,EfficiencyandVoltageRegulation	**CO4**	**08**

Unit5	**Motors:**IntroductiontoACandDCmotors,typesofACmotors,Constructionandoperationofservomotor, Typesandapplications.	**CO5**	**04**
Unit6	**BasicElectricalMeasurement:**TypesofInstruments,TypesofErrorin,Measurement,Absoluteand secondary instruments, Types of Secondary Instruments: Indicating, Integrating Instruments, deflecting torque, controllingtorqueanddampingtorque. IntroductiontoCROandDSO.	**CO6**	**06**

TextBooks	
1.	BasicElectricalEngineering,NagrathI.J.andD.P.Kothari,TataMcGrawHill,2009.
2.	BasicElectricalEngineering,V.KMehta,RohitMehta,S.Chand,2008.
ReferenceBooks	
1.	B.LTheraja,"ElectricalTechnology"VolII,S.Chand&Co.Ltd, India.
2.	BharatiDwivediandAnuragTripathi,"FundamentalsofElectricalEngineering"WileyPRECISETextBook.
3.	V.K.Mehta,"PrinciplesofElectricalEngineering"S.Chand&Co.Ltd,India.
4.	P.V.PrasadandS.Shivanaraju,"ElectricalEngineeringConceptsandApplications"CENGAGELearning.
5.	VincentDelToro,"ElectricalEngineering"PrenticeHall,Inc.EnglewoodCliffs,NewJersey.
6.	AshfaqHusain,"FundamentalsofElectricalEngineering"DhanpatRai&Co.
7.	NagrathI.J.andD.P.Kothari,"BasicElectricalEngineering"TataMcGrawHill.
UsefulLinks	
1.	https://onlinecourses.nptel.ac.in/noc22_ee113/previewByProf.DebapriyaDas,IITKharagpur
2.	https://archive.nptel.ac.in/courses/108/102/108102185byProf.BhimSingh,IITDelhi
3.	https://nptel.ac.in/courses/108108076byProf.L. Umanand,Bangalore.

SCHEMEOFINSTRUCTION&SYLLABI

NameofProgramme: ElectricalEngineering

SchemeofInstructions: SecondYearB.Tech.inElectricalEngineering

Semester–III

Sr. No.	Course Category	Course Code	CourseTitle	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME			
									MSE	ISE/CA	ESE	TOTAL
1	PCC	EE0331	ElectricalCircuitAnalysis	3	--	--	3	3	30	10	60	100
2	PCC	EE0332	SignalsandSystems	3	1	--	4	4	30	10	60	100
3	PCC	EE0333	ElectricalMeasurementand Instrumentation	3	--	--	3	3	30	10	60	100
4	FP	EE0334	ElectricalMeasurementand InstrumentationLab.	--	--	2	2	1	--	50	25	75
5	MDM	EE0335	Multi-disciplinaryMinor–01	2	--	--	2	2	30	10	60	100
6	OE	EE0336	OpenElective-01	3	--	--	3	3	30	10	60	100
7	HSSM	EE0337	UniversalHumanValues	2	--	--	2	2	--	50	--	50
8	FP	EE0338	ElectricalCircuit AnalysisLab.	--	--	2	2	1	--	50	25	75
9	HSSM	EE0339	SoftSkillDevelopment	2	--	--	2	2	--	50	--	50
10	OE	EE03310	OpenElective-01Lab	--	--	2	2	1	--	25	25	50
			Total	**18**	**1**	**6**	**25**	**22**	**150**	**275**	**375**	**800**

L-Lecture T-Tutorial P-Practical

MSE-Mid Semester Examination ISE/CA-In Semester Evaluation/Continuous Assessment

ESE-EndSemesterExamination(ForLaboratoryEndSemester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme CoreCourse (PCC)	Programme Elective Course (PEC)	OpenElective other thanparticular Programme (OE/MDM)	Vocational and SkillEnhancement Course (VSEC)	Humanities SocialScienceand Management (HSSM)	Experiential Learning (EL)	Co-curricularand Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	**16**	**16**	**--**	**--**	**--**	**06**	**04**	**--**	**02**
Semester Credits	**--**	**--**	**10**	**--**	**06**	**--**	**04**	**02**	**--**
Cumulative Sum	**16**	**16**	**10**	**--**	**06**	**06**	**08**	**02**	**02**

PROGRESSIVETOTALCREDITS:44+22=66

Second Year(Sem.–III)B. Tech. Electrical Engineering					
(PCC-EE0331)Electrical Circuit Analysis					
Teaching Scheme			**Examination Scheme**		
Lectures	03Hrs/week		MSE	30	
Tutorials	00Hrs/week		ISE	10	
Total Credits	03		ESE	60	
			Duration of ESE	02Hrs.30Min.	
Prerequisite: BEE					
Course Outcomes(CO): Students will be able to					
CO1	**Determine**voltages, currents,powers,andequivalenceofA.C.andD.C. circuitsusingelectricalcircuit theorems.				
CO2	**Calculate**thetransientandsteadystateresponseoffirstand secondordercircuits.				
CO3	**Analyze**theparametersoftwoportelectricalcircuits andnetworks.				
CO4	**Analyze**acircuitinthes-domain.				
	CourseContents			**CO**	**Hours**
Unit1	**DC Circuits** Ohm‟slaw,Kirchhoff‟slaw,dependent andindependent sources,nodes,branches,loops,voltageandcurrent division, Wye Delta transformations, nodal analysis,mesh analysis,linearity property, superposition theorem, sourcetransformation, Thevenin‟s and Norton‟s theorem, maximumpower transfer.			**CO1**	**08**
Unit2	**FirstOrderCircuits** Capacitors,SeriesandParallelCapacitors,Inductors,SeriesandParallel Inductors,SourcefreeRC,RLcircuits, stepresponseofRC,RL,circuits			**CO2**	**07**
Unit3	**SecondOrderCircuits** Findinginitialandfinalvalues,sourcefreeseriesandparallelRLCcircuits,stepresponseofseriesandparallel RLCcircuits,generalsecond ordercircuits.			**CO2**	**05**
Unit4	**ACCircuitsAnalysis** Sinusoids,phasors,impedanceandadmittance,sinusoidalsteadystateanalysis,nodalandmeshanalysis, superpositiontheorem,sourcetransformation,Thevenin‟sandNorton‟sequivalentcircuit.			**CO3**	**07**
Unit5	**TwoPortNetwork** Impedanceparameters,admittanceparameters,hybridparameters,transmissionparameters,seriesconnectionof			**CO4**	**06**

	twotwo-portnetwork,parallelconnectionoftwotwo-portnetwork,cascadeconnectionoftwotwo-port network.		
Unit6	**AdvancedCircuitAnalysis** Introduction,ApplicationofLaplace transformto linear integro-differentialequation,circuit element modelsfor time to s-domain transformation and circuit analysis, transfer function, state variable method, network stability.	**CO4**	**07**

TextBooks

1.	C.K.AlexandarandM.O.Sadiku,"FundamentalsofElectricCircuits",McGrawHillEducationMH,6thEdition,2018,ISBN:9780078028229

ReferenceBooks

1.	JamesW.NilssonandSusanA.Riedel"ElectricCircuits"PrenticeHall,10thEdition,2015,ISBN:0131989251
2.	L.P.Huelsman,"BasicCircuitTheory",PrenticeHall,3rdEdition,2009,ISBN:9788120309715

UsefulLinks

1.	https://nptel.ac.in/courses/108/104/108104139/
2.	https://nptel.ac.in/courses/108/104/108104139/
3.	https://nptel.ac.in/courses/108/105/108105159/

MappingofCosandPOs

PO → CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PO11	PO12
CO1	3	2										2
CO2	2	2										2
CO3	2	1										1
CO4	1	1										1

1:Slight(Low) 2:Moderate(Medium) 3:Substantial(High)

Shivaji University, Kolhapur

Second Year(Sem.III)B. Tech. Electrical Engineering

(PCCEE0332)Signals and Systems

Teaching Scheme		**Examination Scheme**	
Lectures	**03 Hrs/week**	**MSE**	**30Marks**
Tutorials	**01 Hr/week**	**ISE/CA**	**10Marks**
Total Credits	**04**	**ESE**	**60Marks**

DurationofESE:02Hrs.30Min.

Prerequisite:BasicElectricalEngineering,EngineeringMathematics,ControlSystem,

Course Objectives:

1. Toprovidestudentswithaclearunderstanding ofdifferenttypesandclassificationsofsignalsandsystems, including continuous- time and discrete-time signals.
2. TodeveloptheabilitytodeterminetheresponseofLinear Time-Invariant(LTI)systemsusingconvolutiontechniques.
3. Toemphasisetherelationshipbetweentime-domainandfrequency-domainrepresentationsofdiscrete signals.

Course Outcomes:

Attheendofsuccessfulcompletionofthecourse,thestudentwillbe: CO1.

Determine the Class of the Signal and System.

CO2. Determine the response of the LTI system using convolution.

CO3.Examinesystempropertiesbasedonimpulseresponsethe Fourier

CO4. Apply the Laplace – -transform to analyze the Continuous-time signals

CO5.ApplytheZ–transformtoanalyzethediscrete-timesignalsandsystems.

CO6.Analyzetheirimpactonsignalreconstructionquality.

UnitNo.	Course Content	CO	Hours
Unit1	**IntroductiontoSignalsandSystems** **1) IntroductiontoSignals:** Continuous and Discrete Signals,Elementary Continuous Time and Discrete Time Signals(Unit step, Unit Ramp, Unit Parabolic, Impulse, Rectangular, Triangular, Gaussian and Sinusoidal Functions), Basic Operations on Signals(Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling), Classification of Signals 2) **IntroductiontoSystems:** ClassificationofSystems(Continuousanddiscrete-timesystems,Lumpedanddistributedsystems, Static and dynamic systems, Causaland non-causalsystems, Linear and non-linear systems, Stable and Unstable systems)	**CO1**	**07**
Unit2	**TimeDomainAnalysisofDiscreteandContinuous-TimeSystems** ZeroStateResponse,ZeroinputResponse,ConvolutionsumandConvolutionintegralGraphical representationofConvolution,PropertiesofConvolution,BIBOstabilitycriteriaand Correlation.	**CO2**	**07**
Unit3	**Fourieranalysisofcontinuousanddiscretesignals** Fourierseriesrepresentation,Propertiesofcontinuous-timeFourierseries,Fourierspectrum,Gibb‟s phenomenon, Fouriertransformanditsproperties,Parseval‟stheorem,exponentialFourierspectra,DTFT, Properties and symmetrical properties of DTFT, Convergence of DTFT.	**CO3**	**07**
Unit4	**SystemanalysisusingLaplace transform** A brief introduction to Laplace transforms, the relation between Fourier and Laplace transforms, ROC & its properties (problems on ROC), properties of Laplace transform (problems) and inverse Laplacetransform (problems),transferfunction analysis,solution ofLTIdifferentialequation with andwithout initialcondition.	**CO4**	**07**
Unit5	**SystemanalysisusingZ-transform** AbriefintroductiontoZ–transform,propertiesofROC(problemsonROC)propertiesofZ-transforms,inversionofZ-transformmethods-powerseriesandpartialexpansion,Transforms	**CO5**	**07**

	analysisofLTIsystems,transferfunction(systemfunction),stabilityandcausality,solutionof differenceequations.		
Unit6	**Sampling** Introduction toSamplingprocess,Samplingtheorem,Reconstruction ofsignalsfrom its sample's, aliasing, Sampling in the frequency domain.	**CO6**	**07**
		Total Hours	**42hrs**

TextBooks:

1. "Signal&SystemAnalysis",byDr.J.S.Chitode, UdayA.Bakshi.
2. "Signals&Systems",byTarunKumarRawat.
3. "Signal&System",byAlanV.Oppenheim,AlanS.Willsky.

ReferenceBooks:

1. "LinearSystemsandSignals",B.P.Lathi,OxfordUniversityPress,2ndedition, 2005
2. "Signalsandsystems",SimonHaykin,WileyPublications
3. H.PHsu,R.Ranjan,"SignalsandSystems",Scham'soutlines,TMH,2006.
4. B.P.Lathi,"LinearSystemsandSignals",OxfordUniversityPress,2005.
5. GaneshRaoandSatishTunga,"SignalsandSystems",Pearson/Sanguine.
6. AlanV.Oppenheim,AlanS.Wilsky,S.HamidNawab–"Signals&system",-IIndEdition-PearsonEducation.
7. "SignalsandSystems", byS.Palani, AneBooksPvt.Ltd

UsefulLink/NPTELCourse:

1.	**PrinciplesofSignalsandSystems** ByProf.AdityaK.Jagannatham,IITKanpur
2.	**SignalsandSystems** ByProf.HiteshShrimali,Prof.KushalK.Shah,IITMandi,IISERBhopal

MappingofCOsandPos

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2
CO3	3	3	2	2	2	-	-	-	-	-	-	2
CO4	3	3	2	3	2	-	-	-	-	-	-	2
CO5	3	3	2	3	3	-	-	-	-	-	-	2
CO6	3	3	2	3	2	2	2	-	-	-	-	2

1:Slight(Low)2:Moderate(Medium)3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

EE0333:ElectricalMeasurementandInstrumentation

TeachingScheme		ExaminationScheme	
Lectures	03Hrs./week	MSE	30
Tutorials	00Hrs./week	ISE/CA	10
TotalCredits	03	ESE	60
		DurationofESE	02 Hrs.30Min

Prerequisite:BasicElectricalEngineering,Physics,Engineeringmathematicsandsciencestream

CourseObjectives:

1.ToIdentifyerrorsinthe instruments.

2.To Identifyunknownelectricalparametersbyusingvariousmethods.

3.ToSolvethenumericalonrangeextensionof meters.

4.ToDiscussvariousmethodsofmeasurementofPower&Energy.

5.To Demonstratedigitalandadvanceinstruments.

6.ToExaminetheoreticallytheperformanceofCT‟sandPT‟s.

CourseOutcomes(CO):

Attheend ofsuccessfulcompletionofthecourse,the studentwillbe

CO1	Explainvariousconceptsofmeasuringinstruments.
CO2	Explaindifferenttypesofsecondaryinstruments.
CO3	Determinedifferentmethodsformeasurementofresistance,inductance&Capacitance.
CO4	Describevarious methodsformeasurementofPower &energy.
CO5	Illustrate&Explainconceptofdisplacementmeasurement.
CO6	Describevarious moderntechniquesusedin measurement.

UnitNo.	CourseContents	CO	Hours
Unit1	**BasicofMeasuringInstruments:** Types of Instruments, Types of Error in Measurement, Absolute and secondary instruments, Types of Secondary Instruments: Indicating, Integrating Instruments, Construction, working principle, torque equation,advantagesanddisadvantagesofMoving Iron(MI),Permanent Magnet MovingCoil(PMMC), Shunts,multipliers(NumericalExpected).	**CO1**	**07**

Unit2	**MeasurementofElectricalParameters:** Measurement of low, mediumand highresistance using following bridges. Wheatstone bridge, Kelvin‟s double bridge, ammeter-voltmeter method, Megger, Earth tester, Maxwell‟s Inductance bridge, Maxwell‟s Inductance & Capacitance Bridge, Hay‟s bridge, (Numerical on Maxwell Bridge), Power & Its types(Active,Reactive&ApparentPower),Powerfactor,lowpowerfactorwattmeter,poly-phase wattmeter.	**CO2**	**07**
Unit3	**MeasurementofPowerandEnergy** Active&reactivepowermeasurementinthreephasesystemforbalancedandunbalancedloadusingthree wattmeter method, two wattmeter method & one wattmeter method. Single Phase and Three Phase Induction Type Energy meter- Construction, working principle, advantages and disadvantages.	**CO3**	**07**
Unit4	**MeasurementofElectronicsinstruments:** **DigitalEnergyMeter,Blockdiagramandoperationofelectronicenergymeter.Threephaseenergymeters. TestingofenergyMeters.ConstructionandworkingprincipleofCRO&DSO,advantagesand disadvantages of DSO over CRO. Electronic Multi meters, Electronic Ohmmeter.**	**CO4**	**07**
Unit5	**Transducers&DisplacementMeasurement:** **Transducers:Introduction,classification,basicrequirementsfortransducers.SelectionofTransducer, Electricaltransducer, Resistive transducer, Resistance thermometer, capacitive transducer, Piezo electric &photo electric transducer, temperature transducers. Displacement Measurement- LVDT&RVDT**	**CO5**	**07**
	construction,working,application,advantages,disadvantages.HalleffectTransducers,WaveAnalyzers& HarmonicDistortion,andPowerAnalyzer.		
Unit6	**InstrumentTransformersandMeasurementofNon-ElectronicQuantities:** **Construction,workingandapplicationsofCT&PT,Potentiometers,StrainGaugeanditstypes, Thermistors, Thermocouples, Measurement of pH Value.**	**CO6**	**07**
		Total Hours	**35hrs.**

TextBooks	
1.	ACourse inElectricalandElectronicMeasurements&InstrumentationA.K.SawhneyDhanpatRai&Co.9th2014.
2.	ACourseinElectronics&ElectricalMeasurements&InstrumentationJ.B.Gupta,S.K.Kataria&Sons.8th2012
ReferenceBooks	
1.	ElectricalMeasurements&MeasuringInstrumentsE. W. GoldingF. C. WiddiesReemPublications3rd2011.
2.	ElectricalMeasurement&InstrumentationRSSirohiRadhakrisnanNewAgeInternational3rd 2010.
UsefulLinks/NPTELcourse:	
1.	https://nptel.ac.in/courses/108105153byProf.AvishekChatterjeeIITKharagpur.

COsandPOsMapping

PO → CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	-	-	-	1	1	-	3
CO2	3	3	2	1	2	-	-	-	1	1	-	3
CO3	3	3	2	1	2	-	-	-	1	1	-	3
CO4	3	3	2	2	2	-	-	-	1	1	-	3

1:Slight (Low) **2:Moderate(Medium)** **3:Substantial(High)**

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

EE0334:ElectricalMeasurementandInstrumentationLab

TeachingScheme		ExaminationScheme	
Lectures	--Hrs./week	MSE	--
Tutorials	--Hrs./week	ISE/CA	50
Practical	02	ESE	25
TotalCredits	01	DurationofESE	--

Prerequisite:BasicElectricalEngineering,Physics,EngineeringMathematicsandScienceStream

CourseObjectives:

1.ToIdentifyerrorsinthe instruments.

2.ToIdentifyunknownelectricalparametersbyusingvariousmethods.

3.ToSolvethe numericalonrangeextensionofmeters.

4.To DiscussvariousmethodsofmeasurementofPower&Energy.

5.ToDemonstratedigitalandadvanceinstruments.

6.ToExaminetheoreticallytheperformanceofCT"sandPT"s.

CourseOutcomes(CO):

Attheend ofsuccessfulcompletionofthecourse,the studentwillbe

CO1	Understandtheworkingofvariousmeasuring instruments.
CO2	Abletoanalysevariouspowermeasurementmethods.
CO3	Abletousevarioustestand measuring instruments.
CO4	Abletomeasurephysicalquantitiesusingtransducers.
CO5	Abletorecognizetheinstrumentsforeachmeasurementandtheir connections.
CO6	DemonstratetheworkingofInstrumentTransformersandspecialpurpose meters.

	CourseContents	CO	Hours
1.	Demonstrationofvariousanalogmeasuring instruments.	**CO1**	**02**
2.	MeasurementofActive&reactivepowerinthreephasecircuitusingtwowattmetermethod.	**CO2**	**02**
3.	CalibrationofSingle-phaseInductiontypeenergymeter atdifferentpowerfactors.	**CO3**	**02**
4.	Measurementofresistancebyammeter voltmetermethod.	**CO3**	**02**

5.	MeasurementofresistanceusingWhetstone‟s/Kelvin‟sbridge.	**CO5**	**02**
6.	MeasurementofinductanceusingMaxwell‟s/Hay‟s/Anderson‟sbridge.	**CO5**	**02**
7.	MeasurementofcapacitanceusingSchering‟sbridge.	**CO5**	**02**
8.	Measurementofearthresistanceusing earthtester.	**CO3**	**02**
9.	Displacementmeasurement byLVDT.	**CO4**	**02**
10.	StudyofDigitalMeters andOscilloscopes.	**CO5**	**02**
11.	StudyofPowerAnalyzer‟s.	**CO5**	**02**
12.	StudyofC.T.andP.T.	**CO6**	**02**

TextBooks

1.	“ACourseinElectricalandElectronicMeasurements&Instrumentation”,A.K.SawhneyDhanpatRai&Co. 9th2014.
2.	“ACourseinElectronics&ElectricalMeasurements&InstrumentationJ.B. Gupta”,S.K.Kataria& Sons. 8th2012

ReferenceBooks

1.	“ElectricalMeasurements&MeasuringInstruments”, E. W. GoldingF. C. WiddiesReemPublications3rd2011.
2.	“ElectricalMeasurement&Instrumentation”,RSSirohiRadhakrisnanNewAgeInternational3rd 2010.

UsefulLinks/NPTELcourse:

1.	https://nptel.ac.in/courses/108105153byProf.AvishekChatterjeeIITKharagpur.

MappingofCOsandPOs

PO → CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	-	-	-	1	1	-	3
CO2	3	3	2	1	2	-	-	-	1	1	-	3
CO3	3	3	2	1	2	-	-	-	1	1	-	3
CO4	3	3	2	2	2	-	-	-	1	1	-	3

1:Slight(Low) 2:Moderate(Medium) 3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.–III)B.Tech.ElectricalEngineering

(EE0335)MDM01-IntroductiontoElectricalandElectronicsCircuits

TeachingScheme		ExaminationScheme	
Lectures	**02Hrs./week**	**MSE**	**30**
Tutorials	**00Hrs./week**	**ISE**	**10**
TotalCredits	**02**	**ESE**	**60**
		DurationofESE	**02Hrs.30Min**

Prerequisite:BasicElectrica`lConcepts,MathematicsandPhysics.

CourseObjectives: Bytheendofthiscourse,studentsshouldbeableto:

1.UnderstandBasicConcepts likefundamentalelectricalquantities(voltage, current,resistance,power,energy).

2.AnalyzeACCircuits likesinusoidalwaveforms,phaserelationships,resonanceandpowerfactorcorrectioninACcircuits.

3.Understandthetransientresponses likeRLandRCtransient.

4.Understandingtheoperationofsemiconductordiodes,includingtheircharacteristicsandapplications.

5.UnderstandBasicComponentslikeBJT,FETandMOSFET.

6.Learnaboutadvancedcoursesindigital, analogandpowerelectronics.

CourseOutcomes(CO): Attheendofsuccessfulcompletionofthecourse,thestudentwill be

CO1	UnderstandingofCircuitFundamentalsofCurrent,Voltage,Poweretc.,
CO2	AnalyzetheACCircuitsusingphasortechniques.
CO3	AnalyzethetransientresponseofRCandRLCircuits.
CO4	Analyzethesemiconductorcomponentslikediodes,PNjunctionsetc.,
CO5	Understandthe operationoftransistors.
CO6	Understandthebasicsofdigital,embeddedand IoTsystems.

Units	CourseContents	CO	Hours
Unit1	**FundamentalsofElectricalCircuits,NetworkTheoremsandCircuitAnalysis:** Basicelectricalquantities:Charge, Current, Voltage, Power andEnergy, Ohm‟s LawandKirchhoff‟s Laws(KCL & KVL), Series and Parallel Circuits, Resistance, Conductance, and Electrical Materials, Voltage and Current Division, SuperpositionTheorem, Thevenin‟s andNorton‟s Theorems, MaximumPower Transfer Theorem, Star-Delta (Y-Δ) Transformation, Mesh and Nodal Analysis.	**CO1**	**07**
Unit2	**ACCircuitsandPhasors:** Sinusoidal Waveforms: RMS and Average Values, Phasor Representation of AC Signals, Impedance and Admittance (RLC Elements), Resonance in Series and Parallel Circuits, Power in AC Circuits: Active, Reactive, and Apparent Power, Power Factor Correction.	**CO2**	**04**
Unit3	**TransientAnalysisofElectricalCircuits:** First-Order Circuits:RLandRCTransients, Second-Order Circuits:RLCTransients, TimeConstantsandNatural Response, Forced Response and Step Response.	**CO3**	**04**
Unit4	**Introduction to Semiconductor Devices:** Overview of Semiconductors: Conductors, Insulators, and Semiconductors,PNJunctionDiode:CharacteristicsandApplications,ZenerDiode:VoltageRegulation,Light Emitting Diodes (LEDs) and Photodiodes	**CO4**	**05**

Unit5	**BipolarJunctionTransistors(BJTs),FieldEffectTransistors(FETs),MOSFETsandApplications:**Structure and Working of BJTs, Biasing of BJTs: Fixed, Voltage-Divider, and Emitter Stabilized Bias, BJT as an Amplifier and Switch, Load Line Analysis and Small Signal Model. Introduction to FETs: JFETs and MOSFETs, CharacteristicsandBiasingofMOSFETs,MOSFETasaSwitch,ComparisonbetweenBJTsandMOSFETs.	**CO5**	**05**
Unit6	**BasicofDigitalElectronics,EmbeddedSystemsandIoT:**NumberSystemsandBooleanAlgebra,LogicGates andTruthTables, CombinationalCircuits:Multiplexers, Encoders, Decoders, SequentialCircuits:Flip-Flops and Registers. Basics of Microcontrollers (Arduino, RaspberryPi), Sensors and Actuators, IoT in Smart Electronics	**CO6**	**05**
		Total Hours	**45hrs**

TextBooks	
1.	**"FundamentalsofElectricCircuits"**–CharlesK.AlexanderandMatthewN.O.Sadiku
2.	
Reference Books	
1.	**"ElectricCircuits"**–JamesW.NilssonandSusanA. Riedel
2.	**"IntroductoryCircuitAnalysis"**–RobertL.Boylestad
3.	
UsefulLinks	
1.	https://archive.nptel.ac.in/courses/117/106/117106108/byProf.NagendraKrishnapura,IITMadras.
2.	https://onlinecourses.nptel.ac.in/noc22_ee109/previewbyProf.BhimSingh,IITDelhi

MappingofCOsandPOs

PO → CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO6	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
CO6														

1:Slight(Low) 2:Moderate(Medium) 3:Substantial(High)

ShivajiUniversity,Kolhapur

B.Tech.ElectricalEngineering

(EE0336)OpenElective-01-Energy Storage Systems

Teaching Scheme		**Examination Scheme**	
Lectures	**03 Hrs./week**	**MSE**	**30Marks**
Tutorials	**00 Hrs./week**	**ISE/CA**	**10Marks**
TotalCredits	**03**	**ESE**	**60Marks**

Total=100 Marks

DurationofESE02Hrs.30 Min

Prerequisite:1.BasicElectricalEngineering2.PowerSystem 3.GeneralScience

Course Objectives:

Theobjectivesofthecourse is:

1. Discusstheenergystorageasastructureunit offorce system
2. Comparevariousenergystoragetechnologyforpowersystem
3. Applybatteryenergystorageandmanagementfor powersystem
4. Describehydrogeninthestorageforpower system
5. Discussshorttermatomandlongtermapplicationsofcausesystem
6. Analyseeconomic andreliabilityofenergystoragesystem

Course Outcomes:

Attheendofsuccessfulcompletionofthecourse,thestudentwill be:

CO1Acquiretheknowledgeofworking,constructionaldetailsofEnergyStorageStructure. CO2

Understand the working of Energy Storage Technologies.

CO3UnderstandtheBatteryManagement System.

CO4Understandthe EnergyStorageBasedonhydrogen.

CO5UnderstandtheapplicationsofEnergyStorage.

CO6AnalysetheEconomicsandReliabilityofElectricEnergyStorageSystem.

UnitNo.	Content	CO	Hours
Unit1	**Introduction of Energy Storage:** Energy Storage as structural unit of a power system, General considerations, Definitions of Energy, power, storage form of energy, Technical Definitions, capacity, Depth of Discharge, State of Charge. Round-Trip Efficiency under Normal, Ideal and Real Conditions, Charge and Discharge Losses Energy and power balance in storage unit, Mathematical model of storage, Econometric modelofstorage,Characteristicsofstoragesystem,Storageapplications,Staticdutiesofstorageplant, Storageatuser'slevel.	**CO1**	**07**
Unit2	**Energy Storage Technologies:** Pumped Hydroelectric Storage, Compressed Air Energy Storage the flywheel energystorage system super capacitor in a storage system.	**CO2**	**07**
Unit3	**Battery Energy Storage:** Introduction, different types of battery energy storage, Conventional Batteries and FlowBatteries,BasicConcepts,Lead-acidbatteries,Nickel-Cadmiumbatteries,Sodium-Sulphurbatteries, Lithium-basedbatteries,FlowBatteryEnergyStorageSystem,BatteryManagementSystem(BMS), modelling of batteries, battery management systems, aging of batteries.	**CO3**	**07**
Unit4	**EnergyStorageBasedonhydrogen:**Introduction,Structureofastoragesystembasedon hydrogen, electrolysis of water, storage of hydrogen, conversion, efficiency considerations.	**CO4**	**07**
Unit5	**Applications of Energy Storage:** Short-term applications of Energy Storage, fluctuation suppression, Low Voltage Ride- Through (LVRT), Voltage Control Support, Oscillation Damping, Primary Frequency Control, an example of Fluctuation suppression, mid and long-term applications, Load Following, Peak Shaving, Transmission Curtailment, Time Shifting, Unit Commitment, Seasonal Storage.	**CO5**	**07**
Unit6	**Economics and Reliability of Electric Energy Storage System:** Economics and Reliability of Electric Energy Storage System, Electric Energy Storage Economics, costanalysis, investment and operationcosts analysisofEES,reliabilityinpowerenergysystems, Grid-reliabilitycalculation, andstoragesystemreliability.	**CO6**	**07**
		Total Hours	**42hrs**

TextBooks:

1.Frank S.Barnes&JonahG.Levine,LargeEnergyStorageSystemHandbook,CRCPress, 2011.

ReferenceBooks:	
1. A.Ter-Gazarian1994, “EnergyStorageforPowerSystems,”PeterPeregrinusLtd.London. 2. FranciscoDiaz-Gonazalez,AndreasSumper,“EnergyStorageinPowerSystem”Wiley,2016. 3 Alfred Rufer , “EnergyStorage System and Components,” CRC Press 2018.	
UsefulLink/NPTELCourse:	
1.	EnergyStorageSystembyDr.SanjibGanguly,IITGuwahati.

MappingofCOsandPOs

PO→ CO↓	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**_**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**-**	**-**
CO2	**3**	**2**	**_**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**-**	**-**
CO3	**3**	**2**	**_**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**-**	**-**
CO4	**3**	**2**	**_**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**-**	**-**
CO5	**3**	**2**	**_**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**-**	**-**
CO6	**3**	**2**	**_**	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**-**	**-**

1:Slight(Low)2:Moderate(Medium) 3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

(EE0337)HSSM-UniversalHumanValues

TeachingScheme		ExaminationScheme	
Lectures	02Hrs./week	MSE	--
Tutorials	00Hrs./week	ISE/CA	50
Practical	00	ESE	--
TotalCredits	02	DurationofESE	--

Prerequisite: Yoga,ProfessionalCommunication,IndianKnowledgeSystem.

CourseOutcomes: Afterthesuccessfulcompletionofthiscoursethestudent willbeable

CO1	Describetheconceptofvalueeducationanditssignificanceinshapingpersonaland professionallife.
CO2	Analyzetherelationshipbetweenfundamentalhumanaspirationssuchashappinessandprosperityandtheirinfluenceonpersonal development.
CO3	Evaluatepracticesthatpromoteharmonybetweentheselfandthebodyforholisticwell-being.
CO4	Demonstrateethicalvaluesandeffectivecommunicationininterpersonalandprofessionalrelationships.
CO5	Assesstheinterconnectionbetweenindividuals,society,universalorder,andnaturetopromotesustainableliving.
CO6	Developethicaldecision-makingframeworksforasmoothtransitionfromacademictoprofessionallife.

Unit	CourseContents	CO	Hours
Unit1	Introduction to Value Education: Right understanding, relationship, and physical facility (holistic development andthe roleof education), understanding value education, self-exploration as theprocess for value Education.	CO1	03
Unit2	FundamentalHumanAspirations:Continuoushappinessandprosperity–thebasichumanaspirations, happiness and prosperity – current scenario, method to fulfill the basic human aspirations.	CO2	05
Unit3	HarmonybetweenSelfandBody:Understandinghumanbeingastheco-existenceoftheselfandthebody. Distinguishing between the needs of the self and thebody, thebody as aninstrument of theself, Understanding harmony in the self, harmony of the self with the body.	CO3	05
Unit4	ValuesinHumanInteraction:HarmonyintheFamily–theBasicUnitofHumanInteraction,'Trust'–the FoundationalValueinRelationship,'Respect'–astheRightEvaluation,Other Feelings, JusticeinHuman-to- Human Relationship	CO4	05
Unit5	Society, Universal Order, and Nature: Understanding Harmony in the Society, Vision for the Universal Human OrderandUnderstandingHarmonyintheNature,Interconnectedness,self-regulationandMutualFulfillment amongtheFourOrdersofNature,RealizingExistenceasCo-existenceatalllevels.	CO5	04
Unit6	EthicalConductandProfessionalTransition:NaturalAcceptanceofHumanValues,Definitivenessof(Ethical) HumanConduct,ABasisfor HumanisticEducation,HumanisticConstitutionandUniversalHumanOrder, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models.	CO6	04

TextBooks	
1	R.R.Gaur,R.Asthana,G.P.Bagaria,“TheTextbookAFoundationCourseinHumanValuesandProfessionalEthics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
2	R.R.Gaur,R.Asthana,G.P.Bagaria,“TheTeacher‟s ManualTeachers:ManualforAFoundationCourseinHumanValuesand Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93 87034-53-2.
ReferenceBooks	
1	DRKiran,“Professionalethicsandhumanvalues”,McGrawHillEducation(India)PrivateLimitedP-24,2ndedition,2014, GreenParkExtension,NewDelhi110 016
2	V.Jayakumar,“ProfessionalethicsandHumanvaluesinEngineering”
3	R.S.Naagarazan,“ATextbookonProfessionalEthicsandHumanValues”,NewAgeInternationalPvt.LtdPublishers,Year: 2007 ISBN: 8122419380,9788122419382,9788122423013
4	RudolfSteiner,“HumanValuesinEducation(TheFoundationsofWaldorfEducation,20)”,AnthroposophicPress,Year:2004, ISBN: 0880105445,9780880105446
UsefulLinks	
1	https://nptel.ac.in/courses/109104068ExploringHumanValues:VisionsofHappinessandPerfectSociety,IITKanpur,Prof.A.K. Sharma
2	https://onlinecourses.nptel.ac.in/noc23_hs89/previewMoralThinking:AnIntroductionToValuesAndEthics,ByProf.Vineet Sahu | IIT Kanpur.
3	https://uhv.org.in/course

MappingofCOsandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	1	1	1	2	-	-	1	2	-	1
CO2	-	-	2	-	-	3	-	2	-	3	-	2
CO3	-	-	2	1	-	3	1	3	-	-	-	2
CO4	-	1	-	-	-	-	1	2	1	3	1	1
CO5	-	-	1	2	-	2	-	3	-	2	1	-
CO6	-	-	1	3	-	-	-	-	-		1	-

1:Slight(Low)2:Moderate(Medium)3:Substantial (High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

(EE0338)ElectricalCircuitAnalysisLab

TeachingScheme			ExaminationScheme	
Lectures	--Hrs/week		MSE	--
Tutorials	--Hrs/week		ISE/CA	50
Practical	02		ESE	25
TotalCredits	01		DurationofESE	--

Prerequisite:BasicElectricalEngineering.

CourseObjectives:

Tomakestudentsdemonstrateelectricalcircuittheoremsthroughvariousexperiments.

Todevelopskillsforexperimentingwithfirstandsecondorderelectricalcircuits.

Todevelopskillstomeasuretwoportelectricalnetworks.

CourseOutcomes(CO):

Attheend ofsuccessfulcompletionofthecourse,the studentwillbe

CO1	**Verify**ACandDCcircuittheoremsthroughexperimentsand simulation.
CO2	**Analyze**firstandsecondordercircuitsthroughsimulations.
CO3	**Analyze**firstandsecondordercircuitsthroughexperiments.
CO4	**Measure**parameterofanytwo portnetwork.

	CourseContents	CO	Hours
1.	Simulationand experimentalverificationofNodaland MeshAnalysis.	**CO1**	**02**
2.	SimulationandexperimentalverificationofSuperpositionTheorem.	**CO1**	**02**
3.	SimulationandexperimentalverificationofThevenin‟sandNorton‟sTheorem.	**CO1**	**02**
4.	SimulationandexperimentalverificationofMaximumPowertransferTheorem.	**CO1**	**02**
5.	Analysisoftransientand steadystatebehavioroffirstorder circuit.	**CO2**	**02**
6.	SimulationandexperimentalValidationonstepresponseofsecondordercircuit.	**CO3**	**02**
7.	ComputeZ, Y,ABCDandhybridparametersusingMATLABsoftware.	**CO4**	**02**

8.	AnalysisofACcircuitsusingMeshand Nodalanalysis.	**CO1**	**02**
9.	Simulationofthreephasebalanced andunbalancedstaranddeltanetworksusingMATLABsoftware.	**CO1**	**02**
10.	Simulationofstate spacemodelofanelectricalcircuitusingMATLAB software.	**CO4**	**02**

TextBooks

1.	C.K.AlexandarandM.O.Sadiku,"FundamentalsofElectricCircuits",McGrawHillEducationMH,6thEdition,2018,ISBN: 9780078028229

ReferenceBooks

1.	JamesW.NilssonandSusanA.Riedel"ElectricCircuits"PrenticeHall,10thEdition,2015,ISBN:0131989251
2.	L.P.Huelsman,"BasicCircuitTheory",PrenticeHall,3rdEdition,2009,ISBN:9788120309715

MappingofCOsandPOs

PO → CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	3	1	-	-	3	1	-	3
CO2	3	2	1	2	3	1	-	-	3	2	-	2
CO3	3	3	2	1	3	1	-	-	3	2	-	3
CO4	3	2	1	1	2	1	-	-	3	1	-	3

1:Slight(Low) **2:Moderate(Medium)** **3:Substantial(High)**

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

(EE0339)HSSM-SoftSkillDevelopment

TeachingScheme		ExaminationScheme	
Lectures	**02Hrs./week**	**MSE**	**--**
Tutorials	**00Hrs./week**	**ISE/CA**	**50**
Practical	**00**	**ESE**	**--**
TotalCredits	**02**	**DurationofESE**	**--**

Pre-requisites	FirstYearB.Tech. LevelEnglishlanguagecompetency
Course Objectives	TheCourseaimedat- 1. Enhancingcommunication,teamwork,problem-solvingskills. 2. Fosteringadaptabilityandresilienceinengineering contexts.
Course Outcomes	Uponcompletionofthiscourse,studentshouldbeableto– 1. Proficientinoralandwrittencommunication. 2. Effectiveasregardsteamworkandcollaborationskills. 3. Abletoapplycriticalthinkingtoindustrialproblems. 4. Abletodemonstrateadaptabilityandresiliencein profession

Units	CourseContents	Hours
Unit1	Writtencommunication1.EmailWriting4.TechnicalReport	04
Unit2	OralCommunication1.Presentation Skills	04
Unit3	SoftSkills1.Importance ofSoft Skills2.OverviewofVariousSoftSkills	04
Unit4	TeamSpirit&Leadership Ability 1. Understandingteamdynamicsand roles 2. Buildingtrustandrapportwithinteam	04
Unit5	TimeManagementand GoalSetting1.PrioritizationTechniques2.Work-Life Balance	04
Unit6	Assessment 1. Discussiononincorporatingsoft skillsdevelopment intodailypractice 2. CaseStudiesorRole-Play	06

TextBooks

1	SoftSkills,2015,CareerDevelopmentCentre,GreenPearlPublications

ReferenceBooks

1	SharmaR. &KrishnaMohan(2017), BusinessCorrespondenceandReportWriting,McGrawHillEducation.
2	P.D.Chaturvedi&MukeshChaturvedi(2013),BusinessCommunication:Skills,Concepts&Applications, Pearson Publications, New Delhi, 3rd Edition, Seventh Impression
3	K.K.Sinha(2006),BusinessCommunication,2nd Edition(Reprint),GalgotiaPublishing,NewDelhi
4	Khera,S.(1998)."YouCan Win:AStepbyStepToolforTopAchievers."New Delhi: MacmillanPublishersIndia
6	Bradberry,T.,&Greaves,J.(2009)."EmotionalIntelligence2.0."SanDiego,CA:TalentSmart
7	The7HabitsofHighlyEffectivePeoplebyStephenR. Covey, Publisher: FreePress, PublicationYear: 1989,ISBN: 978-0743269513
8	YourBest YearEver:A5-StepPlanforAchievingYourMost Important GoalsbyMichaelHyatt Publisher:Baker Books Publication Year: 2018 ISBN: 978-0801075245
9	Carnegie,D.(2009)."HowtoWinFriendsandInfluencePeople."NewYork:Pocket Books.
10	Dweck,C.S.(2006)."Mindset:TheNew PsychologyofSuccess."NewYork:Ballantine Books.

MappingofCOsandPOs

PO→ CO↓	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									**3**	**3**		
CO2									**3**			
CO3		**2**										
CO4												
CO5												**2**

1:Slight(Low)2:Moderate(Medium)3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

(EE03310)OpenElective-01-EnergyStorageSystemsLab

TeachingScheme			ExaminationScheme	
Lectures	**00Hrs./week**		**MSE**	**--**
Tutorials	**00Hrs./week**		**ISE/CA**	**25**
Practical	**02**		**ESE**	**25**
TotalCredits	**01**		**DurationofESE**	**--**

1.	**Simulation-BasedExperimentsRequirement** Aminimumof**eight(8)**simulation-basedexperimentsmustbeconducted.Theseexperimentsshouldalignwiththe topics covered in **Units 01 to 06** of the course syllabus. Allowablesimulationplatformsinclude,butarenotlimitedto: **MATLAB/Simulink,PSCAD, EMTDC,PSPICE,andVirtualLabs(Vlab).**

SCHEMEOFINSTRUCTION&SYLLABI

NameofProgramme: ElectricalEngineering

SchemeofInstructions: SecondYearB.Tech.inElectricalEngineering

Semester–IV

Sr. No.	Course Category	Course Code	CourseTitle	L	T	P	Contact Hrs./Wk	Course Credits	EXAM SCHEME			
									MSE	ISE/CA	ESE	TOTAL
1	PCC	EE0341	AnalogandDigitalElectronics	3	--	--	3	3	30	10	60	100
2	PCC	EE0342	DCMachineand Transformer	3	--	--	3	3	30	10	60	100
3	PCC	EE0343	ElectromagneticEngineering	3	1	--	4	4	30	10	60	100
4	MDM	EE0344	Multi-disciplinaryMinor–02	2	--	--	2	2	30	10	60	100
5	OE	EE0345	OpenElective -02	2	--	--	2	2	30	10	60	100
6	HSSM	EE0346	StrategicManagement	2	--	--	2	2	--	50	--	50
7	HSSM	EE0347	ProfessionalEthics	2	--	--	2	2	--	25	--	25
8	PCC	EE0348	DCMachine&TransformerLab	--	--	2	2	1	--	50	25	75
9	PCC	EE0349	Analog&DigitalElectronics Lab	--	--	2	2	1	--	25	25	50
10	VEC	EE03410	SoftwareProgrammingfor Electrical Engineering	--	--	2	2	1	--	25	25	50
11	BSC	EE03411	EnvironmentalScience	2	--	--	2	Audit	30	10	60	100
12	VSEC	EE03412	ComputationalMethods	--	--	2	2	1		50	--	50
			Total	**19**	**1**	**8**	**28**	**22**	**180**	**285**	**435**	**800+100 (Audit)**

L-Lecture T-Tutorial P-Practical

MSE-MidSemesterExaminationISE/CA-InSemesterEvaluation/ContinuousAssessmentESE-EndSemesterExamination(ForLaboratoryEndSemesterperformance)

Course Category	BasicScience Courses (BSC)	Engineering ScienceCourses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	OpenElective Otherthan Particular Programme (OE/MDM)	Vocationaland Skill Enhancement Course(VSEC)	HumanitiesSocial Scienceand Management(HSSM)	Experiential Learning (EL)	Co-curricularand Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	**16**	**16**	**10**	**--**	**06**	**06**	**08**	**02**	**02**
Semester Credits	**--**	**--**	**12**	**--**	**04**	**01**	**05**	**--**	**--**
Cumulative Sum	**16**	**16**	**22**	**--**	**10**	**07**	**13**	**02**	**02**

PROGRESSIVETOTALCREDITS:66+22=88

ShivajiUniversity,Kolhapur

SecondYear(Sem.–IV)B. Tech.ElectricalEngineering

PCCEE0341 Analog and Digital Electronics

Teaching Scheme		**ExaminationScheme**	
Lectures	**03 Hrs/week**	**MSE**	**30Marks**
Tutorials	**---**	**ISE/CA**	**10Marks**
TotalCredits	**03**	**ESE**	**60Marks**

DurationofESE02Hrs.30Min

Prerequisite:BasicElectronics,NumberSystem

Course Objectives:

Theobjectivesofthecourse is:

1. Tounderstandthedifferentbiasingcircuitsoftransistorandtheirstabilityfactor
2. Todevelopthe conceptofbasicsofoperationalAmplifieranditsapplications.
3. Tolearnbasictechniquesforthedesignofdigitalcircuitsandfundamentalconceptsusedinthedesignofdigitalsystems.
4. Tounderstand theconceptsofcombinationallogiccircuitsandsequentialcircuits.

Course Outcomes:

Attheendofsuccessfulcompletionofthecourse,thestudentwill be:

CO1. Analyze different biasing circuits oftransistor and their stability factor

CO2.Understandingthefundamentalsofamplifiersandworkingofdifferentoscillator

CO3. Understanding the fundamentals ofoperational amplifiers and their different applications.

CO4.UnderstandingNumbersystems,Basicdigitalsystemsandcircuitsimplificationtechniques.

CO5.Designandanalyzecombinationalandsequentialcircuits,utilizingtoolslikeKarnaughMaps,adders,subtractor,andflip-flopsfor practicaldigitallogicapplications.

CO6.Understand theoperationofshiftregisters,counters,memorysystemsanddata converters

Unit No.	Content	CO	Hours
Unit1	**Transistor:** **Bipolarjunctiontransistor**- Input &outputcharacteristicofBJT inCB, CE &CCconfigurationand α,β,γ parameters (derivation) and their relationship. **TransistorBiasingandstabilization**–operatingpoint,theDCandACloadline,needforbiasing, types:fixedbias,voltagedividerbias,emitterbias,stabilizationfactorsandthermalrunaway.	CO 1	07
Unit2	**Amplifiers:** Conceptofamplification,smallsignalamplifierusingBJT,singlestageCEamplifier,Positiveand negative feedback in amplifier, barkhausen criterion, Introduction to multistage amplifier. **Workingprincipleofoscillators**:colpitts,Hartley,crystal,RCphaseshiftandweinsbridgeoscillator.	CO 2	07
Unit3	**FundamentalsofOp-Amp(IC-741) anditsapplication:** **Introduction to op-amp**: block diagram of op-amp, ideal and practical specifications (such as Input offset voltage, Input offset current,output offset voltage, CMRR, SVRR, Slew rate input biascurrent etc) **Op-Ampconfiguration**:openloopandclosedloop **Application of op-amp as**: Inverting, non-inverting and differential amplifier (Numerical expected), voltage follower, summing, averaging, integrator, differentiator, peak detector,triangular and square wave generator	CO 3	07
Unit4	**DigitalElectronicsFundamentals:** **Introduction to Digital Systems:** Analog vs. Digital Signals Digital System Applications. Binary, Octal, Decimal, and Hexadecimal Signed Binary Numbers (1's and 2's complement) Binary Arithmetic (Addition, Subtraction, Multiplication, Division) Gray Code, BCD (Binary Coded Decimal), Excess-3 **Logic Gates**: AND, OR, NOT, NAND, NOR, XOR, XNOR Truth Tables, Logic Gate Symbols BooleanAlgebra:BasicLawsandTheoremsofBooleanAlgebra,DeMorgan‟sTheorems, SimplificationofBooleanExpressions,DesigningwithAND,OR,andNOT gatessimplification.	CO 4	07
Unit5	**CombinationalandSequentialLogic Circuits:** **Combinational Circuits**: using Karnaugh Maps (2-variable and 3-variable maps) Half Adder, Full Adder, Half Substractor, Full Substractor, Multiplexers, Demultiplexers, Binary to Gray and Gray to Binary Conversions **SequentialCircuits**:Basics:Latches:GatedSRLatch,GatedDLatchFlip-Flops:SR,JK,D,TFlip-	CO 5	07

	Flops		
Unit6	**Advanced Digital Electronics and Data Conversion Techniques** : **Registers:**ShiftRegisters:Serial-InSerial-Out,Parallel-InParallel-Out **Counters:** Up/Down Counters, Ring Counters **MemorySystems:**RAM,ROM,EPROM,EEPROM,andFlashMemory **DataConverters:**Digital-to-AnalogConversion(DAC)Analog-to-DigitalConversion(ADC)	**CO 6**	**07**
		Total Hours	**42hrs.**

TextBooks:

1. "ElectronicDevicesandCircuitTheory",RobertL.BoylestadandLouisNashelsky,PHI/PearsonEducation.9thEdition
2. "PrincipleofElectronics",V.K.Mehata,RohitMehata,S.Chand
3. ElectronicsAnalogandDigitalbyI.J.Nagrath,PHILearningPvt. Ltd.,2013Edition
4. AnilKMaini,VarshaAgarwal:ElectronicDevicesandCircuits,Wiley,2012.
5. DonaldPLeach,AlbertPaulMalvino&GoutamSaha:DigitalPrinciplesandApplications,8thEdition,TataMcGrawHill, 2015

ReferenceBooks:

1. "Op-amps&LinearIntegratedCircuits",RamakantA.Gayakwad,PHIPublicationNewDelhi,2013,4thEdition
2. "ElectronicDevicesandcircuits"JacobMillman, ChristosC.HalkiascTataMcGrawHill,3rdedition,2013
3. StephenBrown,ZvonkoVranesic:FundamentalsofDigitalLogicDesignwithVHDL,2ndEdition,TataMcGrawHill,2005.
4. RDSudhakerSamuel:IllustrativeApproachtoLogicDesign,Sanguine-Pearson,2010.
5. MMorrisMano:DigitalLogicandComputerDesign,10thEdition,Pearson,2008.

UsefulLink/NPTELCourse:

1	**NPTELcourseonDigitalElectronicsCircuit,IIT,Kharagpur.https://nptel.ac.in/courses/108105132/**
2	**NPTELcourseonIntegratedcircuit,MOSFET,OPAMPandtheirapplicationsIISCBangalore.** **https://nptel.ac.in/courses/108/108/108108111/**

MappingofCOsandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	-	-	-	-	-	-	-	-	1
CO2	2	1	1	-	-	-	-	-	-	-	-	1
CO3	2	1	1	-	-	-	-	-	-	-	-	1
CO4	3	3	3	-	-	-	-	-	-	-	-	1
CO5	3	3	3	-	-	-	-	-	-	-	-	1
CO6	3	3	3	-	-	-	-	-	-	-	-	1

1:Slight(Low)2:Moderate(Medium) 3:Substantial(High)

ShivajiUniversity,Kolhapur			
SecondYear(Sem.III)B.Tech.ElectricalEngineering			
(PCCEE0342)DCMachinesand Transformer			
Teaching Scheme	**ExaminationScheme**		
Lectures	**03 Hrs/week**	**MSE**	**30Marks**
Tutorials	**-**	**ISE/CA**	**10Marks**
TotalCredits	**03**	**ESE**	**60Marks**
DurationofESE:02Hrs.30 Min			
Prerequisite:BasicElectricalEngineering			
CourseObjectives:			
Theobjectivesofthecourseis: 1. Tounderstandartofoperationandperformance ofDCmachinesandtransformers. 2. ToevaluateratingsofDCmachines&transformersforvariousapplications. 3. ToevaluatetheperformanceofDCmachinesandTransformersasperIS.			
CourseOutcomes:			
Attheendofsuccessfulcompletionofthecourse,thestudentwill be: CO1.Acquiretheknowledgeofworking,constructionaldetailsofDCmachine. CO2. Understand the working principle of DC motor.			
CO3. Understand working principle of special motors. CO4.Understandtheparameterofsinglephasetransformer. CO5. Understand the poly phase transformer. CO6.Analysetheperformanceofthreephasetransformer.			

UnitNo.	Content	CO	Hours
Unit1	**ConstructionofD.C.Machines.** Electric DC motors: principles ofoperationofdifferent motors constructionand representationpartswith their material schematic diagrams function of motors function of the various parts of different electric motor Types of DC motor, Fleming's left hand rule and principle of operation of motor back EMF and its significancevoltage equationofDC motor. Torqueand speed:armaturetorque, shaft torque, BHP,brake test, losses, efficiency. DC motor starter: necessity, two point and three point starter. Speed control of DC shunt and series motor: flux and armature control. TestingofD.C.Machines: Lossesandefficiency,Breaktest, Swinburn‟stest, Hopkinson‟stest, Retardationtest,FieldtestonD.C.seriesmotor.	CO1	07
Unit2	**DC Generator** **TypesofDCmotor,**Fleming'slefthand rule ConstructionalDetails:PowerflowdiagramofD.C.machines.MagneticcircuitofDCmachines, commentator and brush arrangement, EMF equation, torque equation. Armature Winding: Simple lap winding and wave winding, winding diagram and tables, brush position, dummycoils.Armature Reaction: MMF due to armature winding, flux distribution due to armature currentand resultantfluxdistributioninamachine.Demagnetizationandcrossmagnetizationampere turns,principleofcompensation, compensatingwinding and itsuse in machines. Applications ofDC Machines.Methodofspeedcontrolmethods.	CO2	07
Unit3	**SpecialMotor:**WorkingprincipleandapplicationofBLDC,Universalmotor,Servomotor,Stepper motor.	CO3	07

Unit4	**SinglePhaseTransformer** **Workingprinciple,ConstructionandClassification-** constructionandworkingprincipleoftransformer,classificationoftransformers,constructionandworkingofcoretypeandshelltype transformers, necessity and conditions for parallel operation, advantages & disadvantages of transformer **EMF Equation**- EMF equation and transformation ratio, numerical on EMF equation. **Regulation and Efficiency**- various losses in a transformer, voltage regulation and efficiency in the transformer, equation for voltage regulation and efficiency, condition for maximum efficiency, all day efficiency. **Autotransformer-**advantages&disadvantages, applications	**CO4**	**07**
Unit5	**Three-PhaseTransformers** Construction of 3 phase transformers, three phase transformer groups, factors affecting the choice of connections, three phase transformer connections (delta-delta, star-star, star-delta and delta-star), open delta or V-V connection, Scott three-phase/two phase connection, three winding transformers,equivalentcircuitofthreewindingtransformer,determinationofparametersofthreewinding transformer,voltageregulationofthreewindingtransformer,numericalonthreewindingtransformer.		**07**
Unit6	**PerformanceofThreePhase Transformer** Inrushofmagnetizingcurrent,harmonicphenomenainthreephasetransformers,Harmonicswith different transformer connections, rating of the transformer, transformer name plate as per BIS 2026 **Concept of basic design of transformer** **Coolingoftransformer**-necessityofcoolingoftransformer,typesofcoolingoftransformer	**CO6**	**07**
		Total Hours	**42hrs.**
ReferenceBooks:			

1. R.Krishnan,SwitchedReluctanceMotorDrives–Modeling,Simulation,Analysis,DesignandApplication,,,CRCPress,New York, 2001.
2. P.P.Aearnley,SteppingMotors–AGuidetoMotorTheoryandPractice,,,PeterPerengrinusLondon, 1982.
3. T.KenjoandS.Nagamori,_PermanentMagnetandBrushlessDCMotors,,,ClarendonPress, London,1988.
4. E.G.Janardanan,Specialelectricalmachines,,,PHIlearningPrivateLimited,Delhi,2014.
5. PermanentMagnetSynchronous&BrushlessDCMotorDrives,R.Krishnan,CRCPress.

TextBooks:

1. K.Venkataratnam,SpecialElectricalMachines,,,UniversitiesPress(India)PrivateLimited,2008
2. T.J.E.Miller,BrushlessPermanentMagnetandReluctanceMotorDrives,,,ClarendonPress,Oxford,1989.
3. T.Kenjo,SteppingMotorsandTheirMicroprocessorControls,,,ClarendonPressLondon,1984.

UsefulLink/NPTEL Course:

1.	**ElectricalMachinesI** ByProf.Suman Malati
2.	**ElectricalMachinesI** ByProf.G.SridharaRao,Prof.P.SasidharaRao

Mapping ofCOsandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	_	1	-	1	1	-	-	1	-	-
CO2	3	2	_	1	-	1	1	-	-	1	-	-
CO3	3	2	_	1	-	1	1	-	-	1	-	-
CO4	3	2	_	1	-	1	1	-	-	1	-	-
CO5	3	2	_	1	-	1	1	-	-	1	-	-
CO6	3	2	_	1	-	1	1	-	-	1	-	-

1:Slight(Low)2:Moderate(Medium) 3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.–IV)B. Tech.ElectricalEngineering

(PCCEE0343)ElectromagneticEngineering

Teaching Scheme		**ExaminationScheme**	
Lectures	**03 Hrs/week**	**MSE**	**30Marks**
Tutorials	**01Hrs/week**	**ISE/CA**	**10Marks**
TotalCredits	**04**	**ESE**	**60Marks**

Prerequisite:Vectoranalysis, coordinate systems

Course Objectives:

1. Tounderstand conceptsofvectorsforengineeringelectromagnetic.
2. Tounderstandthestaticelectricandmagneticfield
3. Tounderstandandanalyzethetime-varyingfields,Maxwell"sequations,andelectromagneticwavepropagationindifferentmedia.

Course Outcomes:

Attheendofsuccessfulcompletion ofthe course,thestudentwillbe:

CO1. Understandthebasicmathematicalconceptsrelatedtoelectromagneticvectorfields

CO2.Analyzethestaticelectricandmagneticfields,theirbehaviorindifferentmedia,associatedlaws,boundaryconditionsand electromagnetic potentials.

CO3.ApplyintegralandpointformofMaxwell`sequationsforsolvingtheproblemsofelectromagneticfieldtheory.

CO4. Analyzetimevaryingfields,propagationofelectromagneticwavesindifferentmedia, poyntingtheorem,theirsources&effects

UnitNo.	**Content**	**CO**	**Hours**
Unit1	**VectorAnalysis:** Introduction to Co-ordinate Systems – Rectangular, Cylindrical and Spherical Co- ordinate Systems – Co-ordinatetransformation;GradientofaScalarfield,Divergence ofaVectorfieldandCurlofaVector field-theirphysical interpretation.	**CO1**	**06**

Unit2	**Electrostatics:** Coulomb‟s law, Electric field intensity due to point Charge, infinite line charge, and infinite surface chargedistribution. Electric fluxdensity, Gauss‟slaw andDivergence theorem, Energy, potentialenergy and work done, potential gradient, Electric dipole and its electric field, dipole movement, energydensity inelectrostaticfield	**CO2**	**07**
Unit3	**Conductor, Dielectricsand Capacitance:** Current and current density, Continuity equation of current, properties of conductors, boundary conditions,Energystoredincapacitors,Poisson‟sandLaplace‟sequations,Capacitancebetweenparallel plates and co-axial cable using Laplace‟s equation	**CO2**	**07**
Unit4	**SteadyMagnetic Field:** BiotSavert‟s law,Magneticfielddueto infinitelylongcurrent carryingconductor,MagneticFielddueto infinite sheet of charge, Ampere‟s circuital law, Application to co-axial cable. Curl operator, Magnetic fluxdensity,Stoke‟stheorem.Scalarandvectormagneticpotential,Lorentz‟sforceequation.Energy storedinmagneticfield,boundaryconditions.	**CO2**	**08**
Unit5	**TimevaryingfieldsandMaxwell'sEquations:** Faraday‟s law, General case of Induction, DisplacementCurrent, Modified Amper‟s Law, Maxwell‟sequations (Differential, Integral, Phasor forms) for time varying field.	**CO3**	**07**
Unit6	**ElectromagneticWaves**: Uniformplanewave,waveequationforfreespace,waveequationforlossymedia,wavepropagationin goodconductorandgooddielectric, Poyntingvectorandpower flow	**CO4**	**07**
		Total Hrs.	**42**

TextBooks:

1. MatthewN.O.Sadiku,PrinciplesofElectromagnetic,OxfordUniversityPress,6thEdition
2. HaytW.H.andJ. A.Buck,EngineeringElectromagnetic,McGraw-Hill,8thEdition

ReferenceBooks:	
1. "JosephA.Edminister,Electromagnetics,Schaum"sOutlineSeries,TataMcGrawHill,Revised2ndEdition.	
2. JohnKrausandDanielFleisch,ElectromagneticswithApplications,McGraw-Hill,5thedition	
3. ChengDK,FundamentalsofEngineeringElectromagnetics,Addison-Wesley.	
4. GuruB.S.andH.R.Hizroglu, ElectromagneticFieldTheoryFundamentals,PWSPublicationCompany,Boston,1998.	
5. GangadharK.A.andP.M.Ramanathan,ElectromagneticFieldTheory,KhannaPublishers,2009	
6. AntennaandWavePropagation,K.D. Prasad,SatyaPrakashan	
GeneralInstructions:1.Minimumnumberofassignmentsshouldbe6covering alltopics.	
UsefulLink/NPTELCourse:	
1	**ElectromagneticTheory** ByDr.PradeepKumarK
2	**ElectromagneticTheory** ByProf.D.K.Ghosh

MappingofCOsandPos

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	-	-	-	-	-	-	-	3
CO2	3	3	3	1	-	-	-	-	-	-	-	3
CO3	3	3	3	1	-	-	-	-	-	-	-	3
CO4	3	3	3	1	-	-	-	-	-	-	-	3

1:Slight(Low)2:Moderate(Medium)3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.IV) B.Tech.ElectricalEngineering

EEE0344-MDM-2ElectricalPowerSystem

Teaching Scheme		**ExaminationScheme**	
Lectures	**02 Hrs.**	**MSE**	**30Marks**
Tutorials	**00 Hrs.**	**ISE/CA**	**10Marks**
TotalCredits	**02**	**ESE**	**60Marks**

DurationofESE02Hrs.30Min.

Prerequisite:BasicElectricalEngineering

Course Objectives:

1. Todevelopacomprehensiveunderstandingoftheprinciples,siteselection,andoperationalmechanismsofvariouspowergenerating stations and renewable energy systems, including their design and efficiency considerations.
2. Toequipstudentswiththeskillstoanalyze anddesignmechanicalandelectricalcomponentsofpowersystems, includingoverhead lines, electrical machines, and measurement techniques, ensuring reliability and accuracy.
3. Toenablestudentstoapplyelectricalengineering conceptstopracticalutilizationsystems,suchaslighting,heating,cooling,andtraction, whileintegratingmoderntechnologiesandcontrolstrategiesforefficientperformance.

Course Outcomes:

CO1Evaluateprinciplesandsiteselectionforthermal,hydro,nuclear,gas,anddieselpowerstations. CO2
Analyse solar, wind energy systems, and modern storage for efficiencyand applicability.
CO3Designreliableoverheadpowerlinesconsideringconductors, insulators, corona,andsag.

CO4Explainconstruction,characteristics,andcontrolofDCmachines,induction,andspecialmotors. CO5
Apply analog/digital techniques to measure electrical parameters with accuracy.
CO6Designefficientlighting,heating,cooling,andtractionsystemswithmoderncontrols.

UnitNo.	Course Content	CO	Hours
Unit1	**GeneratingStations** Generating Stations,Thermal Power Station,andChoice of Sitefor Thermal Power Stations,Hydro-electricPowerStation,andChoiceofSiteforHydro-electricPowerStations,NuclearPowerStation, andSelectionofSiteforNuclearPowerStation,GasTurbinePowerPlant,andDieselPowerStation.	**CO1**	**07**
Unit2	**RenewableEnergySources** **Solar Energy** Introduction to Renewable Energy sources, Solar potential, Solar radiation spectrum, Solar radiation geometry, Solar radiation data, Solar Collectors - flat plate, evacuated tube, Cylindrical parabolic, Concentrating paraboloid, Graphical representation of efficiency of various Collectors, Modern thermal energystorage-Ultracapacitors/Supercapacitors, Superconducting materials, New generationbatteries. **Wind Energy** Wind parameters and wind data, Power from wind, Site selection, Wind energy conversion systems and their classification, Construction and working of typical wind mill, Introduction to OTEC	**CO2**	**07**
Unit3	**MechanicalDesignofElectricalPowerSystem** **Main components of Overhead Line, Conductor Materials, Line Supports, Insulators, Type of Insulators, Potential Distribution over Suspension Insulator String, String Efficiency, Methods of Improving String Efficiency, Important Points, Corona, Factors affecting Corona, Important Terms, Advantages and DisadvantagesofCorona,MethodsofReducingCoronaEffect,SaginOverheadLines,Calculationof Sag,SomeMechanicalprinc iples.**	**CO3**	**07**
Unit4	**ElectricalMachines** **Introduction to Electrical machines, DC Machines – Construction and principles, types, Characteristics, Speedcontrol,Inductionmotor,types,construction&workingprinciples,rmf,slip,Torque-speed characteristics,specialmotors**	**CO4**	**07**

Unit5	**ElectricalMeasurement** **Introduction to electrical measurement, measurement errors and accuracy, Analog measurement instruments,Digitalmeasurement instruments,measurementofresistanceand impedance, measurement of Power and Energy and modern measurement techniques.**	**CO5**	**07**
Unit6	**ElectricalUtilizationandTraction** **Introduction to electrical utilization, Electrical lighting systems, Electrical heating and cooling. IntroductiontoElectricTraction,Tractionmotorsandcontrol,Powersupplyfortractionsystems, Applications and emerging trends**	**CO6**	**07**

ReferenceBooks:

1. **"PowerPlantEngineering"byP.K.Nag,PublisherTataMcGraw-Hill,2007ISBN 713,370,919,780,071,000,000**
2. **"Renewable Energy Sourcesand Emerging Technologies" by D.P. Kothari, K.C. Singal, andRakesh Ranjan,Publisher**
3. **PHILearning Pvt. Ltd. ISBN 9389347904, 9789389347906,**
4. **"ACourseinPowerSystems"byJ.B.Gupta, Publisher S.K.Kataria&Sons,2009,ISBN818845852X,9788188458523**
5. **"ElectricalMachinery"byP.S.Bimbhra,PublisherKhannaPublishingHouse,ISBN13 978-93-89139-10-5**
6. **"ElectricalandElectronic MeasurementsandInstrumentation"byA.K. Sawhney,Publisher:ShreeHariPublications,ASIN :B092TMDW24**
7. **"UtilizationofElectricPowerandElectricTraction"by J.B.Gupta,Publisher:VISIONIAS,ASIN:B0CG3CGQR9**

UsefulLink/NPTELCourse:

1. **PowerSystemGeneration,TransmissionandDistribution(CoordinatedbyIITDelhi)**
2. **Non-ConventionalEnergyResources(CoordinatedbyIITMadras)**
3. **PowerSystemEngineering(CoordinatedbyIITKharagpur)**
4. **ElectricalMachines-IandElectricalMachines-II(CoordinatedbyIITKharagpur)**
5. **ElectricalandElectronicMeasurements(CoordinatedbyIITMadras)**
6. **ElectricVehiclesandRenewableEnergy(CoordinatedbyIITDelhi)**

ShivajiUniversity,Kolhapur

FinalYear(Sem.–IV)B.Tech.ElectricalEngineering

EE0345OpenElective02ElectricalMaintenanceandEnergyAudit

TeachingScheme		ExaminationScheme	
Lectures	02Hrs./week	MSE	30
Tutorials	00Hrs./week	ISE	10
TotalCredits	02	ESE	60
		DurationofESE	02Hrs.30Min

Prerequisite:

CourseObjectives:

1.Identifyawiderangeofelectricalequipment&devicesandunderstandtheir principlesofoperation/connections

2.Demonstrateanunderstandingofelectricalsystems,switchgearandcircuit types.

3.Recognizethemostcommonindustrialmotortypesandunderstandtheiroperation,connectionsandmaintenancerequirements

4.Performelectricalisolation,testingforawiderangeofdevicesandcircuitssafely.

5.Learnthemethods ofenergyaudit andusageof instruments.

6.Analyzeandreporttheoutcomeofenergyaudit.

CourseOutcomes(CO): Attheendofsuccessfulcompletionofthecourse,thestudent will be

CO1	UnderstandTypesandConceptsofElectricalMaintenance
CO2	Understandtheimportanceofphysicalinspectiontoensuretransformersafety.
CO3	Understandtheimportanceofcleaningandinsulatingbus barstomaintainperformance.
CO4	Understandthepurposeandfunctionofvariousenergyauditinstruments.
CO5	Understandthecurrentmethodologiesusedinenergyaudits.
CO6	EvaluateandRecommendEnergyEfficiencyMeasures.

	CourseContents	CO	Hours
Unit1	**IntroductiontoElectricalMaintenance** Types of maintenance, maintenance schedules, procedures, Maintenance of Motors: Over hauling of motors, preventive maintenance, and trouble shooting of electric motors. Maintenance of Transmission and Distribution System, danger notice, caution notice permit to work, Patrolling and visual inspection of lines – points to be noted during patrolling from ground: special inspections and night inspections, Location of faults using Meggar.	**CO1**	**05**
Unit2	**MaintenanceofDistributionTransformers:** Transformermaintenanceandpointstobeattendedtoinrespectofvariousitemsofequipment,Checkingofinsulation resistance transformer oil level and BDV test of oil, measurement of earth resistance.	**CO2**	**05**
Unit3	**MaintenanceofGrid Substations:** Checkingandmaintenanceofbusbars,isolatingswitches,HT/LTcircuitbreakers,LTswitches,PowerTransformers.	**CO3**	**04**
Unit4	**GeneralAspectsofEnergyManagementandEnergyAudit** Definition, Need and types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments	**CO4**	**05**
Unit5	**EnergyAuditMethodology&RecentTrends** CurrentPractices,Integrationoftwoormoresystems,SwitchingofEnergySources,Reportwriting,preparationsand presentations of energyaudit reports, Post monitoringof energyconservationprojects, MIS ,Case-studies / Report studies of	**CO5**	**05**

	EnergyAudits.Guidelinesforwritingenergyauditreport,datapresentationinreport,findingsrecommendations,impactof renewableenergyonenergyauditrecommendations.Casestudiesofimplementedenergycostoptimizationprojectsin electrical utilities as well as thermal utilities.		
Unit6	**EnergyEfficiencyinElectricalUtilities** **Electricalsystem:**Electricitybilling, electricalloadmanagementandmaximumdemandcontrol,selectionandlocationof capacitors, performance assessment of PF capacitors, distribution and transformer losses. **ElectricMotors:**Types,lossesininductionmotors,motorefficiency,factorsaffectingmotorperformance,rewindingand motor replacement issues, energy saving opportunities with energy efficient motors. **Fans andBlowers:**Types, performanceevaluation, efficient systemoperation, flowcontrolstrategies andenergy conservationopportunities.LightingSystem:Lightsource,choiceoflighting,luminancerequirements,andenergy conservation avenues.	**CO6**	**06**
TextBooks			
1.	Testing,CommissioningOperationandMaintenanceofElectricalEquipment:SRao,KhannaTechnicalPublication,NewDelhi.		
2.	PreventiveMaintenanceofElectricalApparatus:SKSharotri,KatsonPublishingHouseLudhiana		
ReferenceBooks			
1.	ElectricEnergyGeneration,UtilisationandConservationSivaganaraju, SPearson,NewDelhi, 2012		
2.	EnergyManagement:W.R.Murphy,G.Mckay(Butterworths).		
3.	IndustrialEnergyConservation:D.A.Reay(PergammonPress)		
4.	EnergyManagementHandbook–W.C.Turner(JohnWileyandSons,AWileyIntersciencePublication.		
UsefulLinks			
1.			
2.			

MappingofCOsandPOs

PO →CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	1	2	-	-	-	2	1	-	3	1	2
CO2	3	3	2	1	2	-	-	-	1	1	-	3	3	2
CO3	3	3	2	1	2	-	-	-	1	1	-	3	3	2
CO4	3	2	3	2	2	-	-	-	1	1	-	3	3	2
CO5	2	2	3	2	1	-	-	-	1	1	-	2	2	1
CO6	3	2	2	1	2	-	-	-	2	2	-	2	3	1

1:Slight (Low) **2:Moderate(Medium)** **3:Substantial(High)**

ShivajiUniversity,Kolhapur

SecondYear(Sem.IV)B.Tech.ElectricalEngineering

EE0346HSSMStrategicManagement

Teaching Scheme		**ExaminationScheme**	
Lectures	**02 Hrs./week**	**MSE**	**-**
Tutorials	**-**	**ISE/CA**	**50Marks**
TotalCredits	**02**	**ESE**	**-**

Total=50 Marks

Prerequisite:

Course Objectives:

Theobjectivesofthecourse is:

1) Explorestudentstotheprocessthattopexecutives usuallyfollowinresolvingstrategicmanagementandrelatedissues facedbythefirms.
2) Developknowledgepertainingtotheformulationandimplementationofstrategies.
3) Provideapracticalframeofreferencethatcanbefollowedindevelopingshortand longtermstrategies.
4) Sharpenthestudents'conceptual, analytical, communication, andteamworkskillsthatareneededinanalyzingbusinesssituations.
5) Developandmaturestudents'skills incriticalthinking.
6) Provideanopportunityviaaneclectic`capstone'courseforthestudentstointegrateknowledgeandconceptslearntthroughoutthe curriculum.

Course Outcomes:

Attheendofsuccessfulcompletionofthecourse,thestudentwillbe: CO1 :
Analyze a company‟s external and internal environment;

CO2:ToprovideinformationpertainingtoBusiness,CorporateandGlobalReforms CO
3 :Identify major strategic issues at the corporate- and business-levels ProjectCO 4:
Formulate various international-level strategies.
CO5:Proposeactionablerecommendationsforcorporateexecutives.

CO6:Criticallythinkaboutlivebusinessproblems andfindappropriate solutions.

UnitNo.	Content	CO	Hours
Unit1	**Introduction to Strategic Management** Concept of Strategic Management, Strategic ManagementProcess,Vision,MissionandGoals,BenefitsandRisksofStrategicManagement.Levelsof Strategies: Corporate, Business and Operational Level Functional Strategies: Human Resource Strategy, Marketing Strategy, Financial Strategy, OperationalStrategyand Business Environment: Components of Environment,MicroandMacro andEnvironmentalScanning.	CO1	05
Unit2	**TheNature ofCompetitiveAdvantagesandStrategicFormulation** Natureofcompetitive advantagesand sustainability. Different levelsofstrategy. Lowcost,differentiationand focus strategies. Factors affecting a nation‟s competitiveness. International expansion. International, multidomestic,globalandtransnationalstrategies.Creatingvalueanddiversification,outsourcing, acquisitions,internalnewventures,internati	CO2	05
Unit3	**StrategyImplementation** Meaning&stepsofstrategyImplementation,whatarefunctionalstrategies,itsobjectiveanditsimportance. Organisationalstructuresforstrategyimplementation,importanceoforganisationcultureinstrategy implementation.	CO3	04
Unit4	**StrategicControl-Guiding&evaluatingthe strategy** MeaningofstrategicEvaluation&control,Establishingstrategiccontrol, Methodsofstrategiccontrol, stages of operating controls, Reward system Motivating execution & control.	CO4	04
Unit5	**Business,CorporateandGlobalStrategies**	CO5	05
	Corporate Restructuring Strategies: Concept, Need and Forms, Corporate Renewal Strategies: Concept, InternalandExternalfactorsandCauses,StrategicAlliance:Concept,Types,Importance,ProblemsofIndian Strategic Alliances and International Businesses, Public Private Participation: Importance, Problems and GoverningStrategiesofPPPModel.		
Unit6	**EmergingStrategicTrends** Business Process Outsourcing and Knowledge Process Outsourcing in India, Concept and Strategies. Reengineering Business Processes- Business , Reengineering, Process Reengineering and Operational Reengineering, Disaster Management: Concept, Problems and Consequences of Disasters, Strategies for ManagingandPreventingdisastersandCopeupStrategies.Start-upBusinessStrategiesandMakeinIndia Model	CO6	05

ReferenceBooks:

1. StrategicManagement,ADynamicPerspective-ConceptsandCases–MasonA.Carpenter,Wm.GerardSanders,Prashant Salwan, Published by Dorling Kindersley (India) Pvt Ltd, Licensees of Pearson Education in south Asia 2. StrategicManagementandCompetitiveAdvantage-Concepts-JayB.Barney, WilliamS.Hesterly,PublishedbyPHILearningPrivate Limited, New Delhi **3.** Globalization,LiberalizationandStrategicManagement-V.P.Michael
TextBooks:
1. BusinessPolicyandStrategicManagement–SukulLomashandP.KMishra,VikasPublishingHousePvt.Ltd,New Delhi 2. StrategicManagement–FredR.David, PublishedbyPrenticeHallInternational 3. PublicEnterpriseManagementandPrivatisation–LaxmiNarainPublishedbyS.Chand&CompanyLtd,New Delhi 4. BusinessPolicyandStrategicManagement–SukulLomashandP.KMishra,VikasPublishingHousePvt.Ltd,New Delhi
UsefulLink/NPTELCourse:
1.
2.

MappingofCOsandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	_	-	-	-	-	**3**	**3**	**3**	-	**3**
CO2	-	-	_	-	-	-	-	**3**	**3**	**3**	-	**3**
CO3	-	-	_	-	-	-	-	**3**	**3**	**3**	-	**3**
CO4	-	-	_	-	-	-	-	**3**	**3**	**3**	-	**3**
CO5	-	-	_	-	-	-	-	**3**	**3**	**3**	-	**3**
CO6	-	-	_	-	-	-	-	**3**	**3**	**3**	-	**3**

1:Slight(Low) 2:Moderate(Medium)3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.III) B.Tech.ElectricalEngineering

HSSM0347ProfessionalEthics

TeachingScheme		**ExaminationScheme**	
Lectures	**02 Hrs/week**	**MSE**	**-**
Tutorials	**-**	**ISE/CA**	**25Marks**
TotalCredits	**02**	**ESE**	**-**
			Total=25Marks

Prerequisite:

Course Objectives:

Theobjectivesofthecourse is:

1. Toconnectthelearner totheirpotentialunderstanding moralprofessionalandpersonalvalues
2. Introducethelearnertoprofessionalethicsandenablesthemtowardsdecision-makingskills.
3. Todrawthe learnersattentiontowardsbusiness ethics.
4. Tostrengthenandenhancetheprofessionalittakesthroughapsychologicalapproach.
5. Tocultivatorspiritofworkingindiversewordbyunderstandingworkplaceethics.
6. Toinstallasenseofprofessionalethicswhichhelp themdevelopersafecompatible,prosperous,andsustainable society.

Course Outcomes:

Attheendofsuccessfulcompletionofthecourse,thestudentwill be:

CO1Equip themselveswithunderstandingofmoralprofessionalandpersonalvalues.

CO2Understandtheneedofethicsinshapingtheirprofessionthelearnerwillhonetheirdecision-makingskills.

CO3Refundthebusinessethicsbasedonapsychologicalandphilosophicalperspective. CO4

Have an age over the ethical systems in the workplace.

CO5Assesstheneedforabalancebetweenecology,engineeringand economy.

CO6Equipthemselveswithabetterunderstandingofthemselvesandthesocietytheyliveinandresponsibilitiesthisshoulder increatinga sustainable word.

UnitNo.	Content	CO	Hours
Unit1	**Introduction to professional ethics** morals, values and ethics- Personal and Professional- Sense of Engineering Ethics- Code of Ethics by NSPE- Making decisions with ethical dimensions-definition-roadmaptoethicaldecisionmaking-commonstandards-internalobstacles-bias-empathy.	**CO1**	**05**
Unit2	**BusinessEthics** PhilosophicalapproachestoBusinessEthics-ethicalreasoning-ethicalissuesinbusiness-Social Responsibilityof Business- conflict of interest- culturalrelativism- ethical leadership- Resisting unethical authority and domination- Global Business Ethics.	**CO2**	**05**
Unit3	**Psychologicalapproaches** Ethicaltheories-psychologicalandphilosophicalapproaches-mythsaboutmorality-conflictofinterestin psychological perspective- courage integrity- ethical dilemma- emotional intelligence.	**CO3**	**05**
Unit4	**Workplaceethics** EthicsinchangingdomainofResearch-academicintegrity-intellectualhonesty- RoleofEngineersand Managers-Ethicalissuesindiverseworkplace-competition-freewill-confidentiality-employeerights-Intellectual property rights- discrimination.	**CO4**	**05**
Unit5	**Safety, Responsibilities and Rights** Ecology,Engineering,Economy-Risk benefitanalysisandreducingriskSDGs-CorporatesocialresponsibilityandcorporateSustainability- CSR in India- Sustainability Case Studies.	**CO5**	**03**
Unit6	**Globalissuesinprofessionalethics** Introductioncurrentsscenario,technologyglobalizationofMNC's, InternationalTrade,WorldSummits issues, Business Ethics and Cooperate Governance, Sustainable Development, Ecosystem Energy Consumptions ozone depletion pollution it takes in manufacturing and marketing, Media Ethics, War Ethics,Bioethics, IntellectualPropertyRights.	**CO6**	**05**

ReferenceBooks:

1. MikeWMartinandRolandSchinzinger, "*EthicsinEngineerin"g*,4thedition, TataMcGrawHillPublishingCompanyPvt Ltd, New Delhi,2014 .

TextBooks:

1. Subramanian.R."ProfessionalEthics",OxfordPublication,2013.
2. Nagarasan.R.S."*ProfessionalEthicsandHumanValue"s*.NewAgeInternationalPublications,2006

UsefulLink/NPTELCourse:

1.	https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN.pdf
2.	https://www.nspe.org/resources/ethics/code-ethics
3.	https://www.toolshero.com/tag/ethical-decision-making/
4.	https://pagecentertraining.psu.edu/public-relations-ethics/introduction-to-public-relations-ethics/lesson-1/ethical-theories/
5.	https://www.ewh.ieee.org/soc/pes/switchgear/presentations/tp_files/2017-1_Thurs_Shiffbauer_Singer_Engineering_Ethics.pdf
6.	https://peer.asee.org/case-studies-in-engineering-ethics.pdf

MappingofCOsandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	_	-	-	-	-	3	3	3	-	3
CO2	-	-	_	-	-	-	-	3	3	3	-	3
CO3	-	-	_	-	-	-	-	3	3	3	-	3
CO4	-	-	_	-	-	-	-	3	3	3	-	3
CO5	-	-	_	-	-	-	-	3	3	3	-	3
CO6	-	-	_	-	-	-	-	3	3	3	-	3

1:Slight(Low)2:Moderate(Medium)3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.III)B.Tech.ElectricalEngineering

PCCEE0348DCMachinesandTransformer Lab

Teaching Scheme		**ExaminationScheme**	
Practical's	**02 Hrs./week**	**ISE/CA**	**50Marks**
TotalCredits	**01**	**ESE**	**25Marks**

Prerequisite:BasicElectricalEngineering

CourseObjectives -

1Toconductthe experimentalsetofgiven circuits.

2Todesignand testtheelectricalmotorwithcontroltechnique.

3Tostudythe performanceofOCandSCtestontransformer.

CourseOutcomes(CO)

Studentswillbeableto

CO1.Selectproperelectricalmotorwithcontroltechniquefor required applications.

CO2.AnalyzetheadvancedcontroltechniquesapplicableforACandDCmotorsinpractice. CO3.

Design, develop and simulate advanced control schemes for electrical motors.

Listof Experiments

1.Toperformspeed controlofDCshuntsmotor1.Armaturecontrolmethod,2.field controlmethod	**CO1**	**2Hrs**
2.Tostudytheefficiencyofthemotorbyusingbrake loadtest	**CO1**	**2Hrs**
3.Toobtainopencircuit testcharacteristicsofself-excitedDCshuntgeneratorandtofinditscriticalresistance	**CO1**	**2Hrs**
4.DeterminationofefficiencyofDCmotor bySwinburn test.	**CO2**	**2Hrs**
5.PerformOCandSCtestonsinglephasetransformeranddetermineequivalentcircuitparameter, efficiency.	**CO2**	**2Hrs**
6.To recognizethelordsharingoftwosimilartransformeroperationinparallel.	**CO3**	**2Hrs**
7.To determinetheefficiencyandvoltageregulationofsinglephasetransformerbydirectloading.	**CO2**	**2Hrs**

8.Toperformapolaritytestin facingouttest forathreephase.	**CO3**	**2Hrs**
9.Performopencircuitandshortcircuittestonsinglephasetransformer todetermineequivalentcircuitconstantwith voltageregulationandefficiency	**CO2**	**2Hrs**
10.Performphasingouttest onthreephasetransformerwhosephasemarkingsaremarked.	**CO3**	**2Hrs**
Submission: **ESE** Minimum8experimentstobeperformed/simulatedandevaluatedinjournal.		

MappingofCOsandPOs

PO→CO ↓	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**
CO1	**3**	**2**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	**3**	**2**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	**3**	**2**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**

1:Slight(Low)2:Moderate(Medium)3:Substantial(High)

ShivajiUniversity,Kolhapur

SecondYear(Sem.IV)B.Tech.ElectricalEngineering

PCCEE0349AnalogAndDigitalElectronicsLab

TeachingScheme			ExaminationScheme	
Lectures	**00 Hrs./week**		**MSE**	**--**
Tutorials	**00 Hrs./week**		**ISE/CA**	**25Marks**
Practical	**02 Hrs./week**		**ESE**	**25Marks**
TotalCredits	**01**		**Total**	**50Marks**
			DurationofESE	--

Prerequisite:Basicelectronics,Numbersystem

1. Basicknowledgeofbreadboardconnectionmethods
2. Detailsofvariouselementslikepinconfigurationofdifferentlogicgates,colorcodeofresistorsetc.

CourseObjectives:

1. Toconductexperimentandplotinputandoutputcharacteristicsof BJTindifferentconfigurations.
2. To designand testdifferentapplicationofop-amp
3. To studythesimplificationofBooleanexpressionsusinglogic gates.
4. TorealizedifferentAddersandsubtractors circuits.
5. Demonstratetheoperationsandapplications ofMultiplexers.

CourseOutcomes(CO): Attheendofsuccessfulcompletionofthecourse,thestudentwillbeableto

CO1	AnalyzetheinputandoutputcharacteristicsofBJTinCE andCB configuration
CO2	Designand testtheperformanceofop-ampindifferentapplications.
CO3	Understandtheconceptsofcombinationallogic circuits

	ExperimentList	CO	Hours
1.	**DeterminetheinputandoutputCharacteristicsofBJTinCE &CB configuration**	**CO1**	**02**
2.	**Designandanalysisofop-ampbasedamplifierssuchasInverting,Non-invertingamplifiersfordifferent typesofinputsuchasACand DC signal**	**CO2**	**02**
3.	**DesignandanalysisoftheDifferentialAmplifierasadder andsubtractor**	**CO2**	**02**
4.	**DesignandAnalysistheperformanceofop-ampasintegrator&differentiator usingop-ampfor different typesofAC signal.**	**CO2**	**02**
5.	**Designandanalysisofop-ampbasedRCPhaseshiftoscillatorforagiven frequency**	**CO2**	**02**
6.	**Analysisofbasiclogicgates**	**CO3**	**02**
7.	**RealizationofhalfFulladderandHalfFullSubtractorsusinglogic gates**	**CO3**	**02**
8.	**Analyseandimplementationof8:1 Mux**	**CO3**	**02**

9.	**Analyseandimplementationof1:8 Mux**	**CO3**	**02**
10.	**RealizationofBinarytoGraycode conversionandviceversa.**	**CO3**	**02**
Minimum8 numberofexperiments needtobeperformed			
TextBooks			
1.	"ElectronicDevicesandCircuitTheory",RobertL.BoylestadandLouisNashelsky,PHI/PearsonEducation.9thEdition		
2.	"PrincipleofElectronics",V.K.Mehata,RohitMehata,S.Chand		
ReferenceBooks			
1.	"Op-amps&LinearIntegratedCircuits",RamakantA.Gayakwad,PHIPublicationNewDelhi,2013,4thEdition		
2.	"VStephenBrown,ZvonkoVranesic:FundamentalsofDigitalLogicDesignwithVHDL,2ndEdition,TataMcGrawHill,2005.		
UsefulLinks/NPTELcourse:			
1.	**NPTELcourseonIntegratedcircuit,MOSFET,OPAMPandtheirapplicationsIISCBangalore.** **https://nptel.ac.in/courses/108/108/108108111/**		

MappingofCOsandPOs

PO →CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO6	PO8	PO9	PO10	PO11	PO12
CO1	3	2	--	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	-	-	-	-	-	-	-	1
CO3	3	2	2	-	-	-	-	-	-	-	-	1

1:Slight(Low) 2:Moderate(Medium) 3:Substantial(High)

ShivajiUniversity,Kolhapur	
SecondYear(Sem.IV)B.Tech.inElectricalEngineering	
VECEE03410SoftwareProgrammingforElectricalEngineering	
Practical:2Hrs/Week	**ExaminationScheme**
	ISE/CA:25Marks
Credit:1	**ESE:**25Marks
	Total: 50 Marks

Objectives:

Students are expected to solve Electrical Engineering problems using any available softwaretools such as MATLAB/Simulink, C, C++,PSIM,ETAP,PSCAD,MIPOWER,Power WorldSimulator,SKM PowerTools,VISIO,AUTOCAD,PSPICE,LABVIEW etc.Sampletasksare enlistedbelow.

CourseOutcome(CO): Studentableto	
CO1	UnderstandthebasicsoperationofMATLAB
CO2	Analysisthetimedomainandfrequencydomain signals
CO3	Applyvariouselectriccircuits inMATLABsimulation tool

Sr.No.	Titleof Experiments	CO's	Hrs.
1.	Programmingofatleast3numericalmethodsforsolvingnonlinearequations.	**CO2**	**2hrs**
2.	SimulationofElectricalMachinessuchastransformers,DCmachinesandACmachinesandevaluationof their performance parameters.	**CO3**	**2hrs**
3.	Basicplottingofsignals:TostudyvariousMATLABcommandsfor creatingtwoandthree dimensional	**CO1**	**2hrs**

	plots.WriteaMATLABprogramtoplotthefollowingcontinuoustimeanddiscretetime Signals. .i.StepFunction ii.Impulse Functioniii.ExponentialFunctioniv.RampFunctionv.SineFunction		
4.	SimulationofelectricalR-L-Cnetworks,resonantcircuits, filtercircuitsandplottingtheirinput-output waveforms	**CO1**	**2hrs**
5.	SimulationofHalfwaveandFullwaveRectifiercircuitsandplottingtheirinput-output waveforms	**CO3**	**2hrs**
6.	Simulationofpowersystemnetworksanditsperformanceanalysis(loadflowanalysis,shortcircuit analysis, transient analysis, stability analysis, relay coordination etc.)	**CO2**	**2hrs**
7.	SimulationofDC-DC,DC-AC,AC-DCandAC-ACconvertercircuits,plottingtheirinputoutputwaveforms and performing their analysis	**CO3**	**2hrs**
8.	Measurementtechniquesforelectricalengineeringparametersusingsuitablesoftware	**CO2**	**2hrs**
9.	Simulationofhybridpowersystem(Wind,Solar,SolarSeries/Parallel)	**CO1**	**2hrs**
10.	Designoftypicalcontrolpanelforindustrialapplication	**CO3**	**2hrs**

RecommendedBooks:

1. AgamKumarTyagi,"MatlabandSimulinkforEngineers"OxfordHigherEducation, OxfordUniversityPress.ISBN:9780198072447

2. EdwardB.Magrab,Shapourazarm, BalakumarBalachandran,JamesDuncan,KeithHerold,GregoryWalsh"AnEngineersGuideto MATLAB, 3/E" ISBN-10: 0131991108 • ISBN-13: 9780131991101, Pearson Education Ltd.

3. HollyMoore, "MATLABforEngineers",GlobalEdition,5/E,SBN-10:1292231203•ISBN-13:9781292231204,PearsonEducation Ltd.

4. L.AshokKumar, A.Kalaiarasi,Y.Uma,"PowerElectronicswithMATLAB"CambridgeUniversityP ress2017

5. ViktorPerelmuter,"RenewableEnergySystems:SimulationwithSimulink®andSimPowerSystemsTM"CRCPress,Taylor&Francis

MappingofCosandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO
CO1	3	-	-	1	-	-	1	-	2	-	1	1	-
CO2	-	2	3	3	3	-	1	-	2	2	1	1	3
CO3	3	2	2	3	3	1	1	-	2	2	1	2	3

1:**Slight(Low)2:Moderate(Medium)3:Substantial(High)**

YearandSemester	**SecondYearB.Tech -Semester IV** (CommontoallBranchesofEngineering)				
Course Category	BasicScienceCourses(BSC)				
TitleofCourse	**EnvironmentalScience**			Contact Hrs./Week	Credits
TeachingScheme	L	T	P		
	02	--	--	02	Audit
ExaminationScheme	MSE	ISE/CA	ESE	Total	
	30	10	60	100	

CourseObjectives: Theobjectivesofthecourseisto

1. Understandthescope& multidisciplinarynatureofEnvironmentalStudies.
2. Getacquaintedwiththeproblemsassociated withnaturalresourcesandtheirconservation.
3. Familiarizetheenvironmental&socialproblemswithglobalconcern.
4. RecognizetheimportanceofBiodiversitywithrespectto WesternGhats.

CourseOutcomes:

COs	Attheendofsuccessfulcompletionofthecourse,thestudentwillbeable to	BloomsTaxonomy
CO1	UnderstandtheimportanceofEnvironmentalStudiesandrecognizesignificance ofecosystem.	II
CO2	Classifythevaluesofnaturalresourceswithassociatedproblemsforsustainablelifestyles.	II
CO3	Describethesocialandglobalenvironmentalissues	II
CO4	MakeawareofPollutionissueswithitsmitigationmeasures.	II
CO5	FamiliarizethebasicsofBiodiversityand concerned issuesinthecontextofWesternGhats.	II
CO6	Acquaintwiththeroleofenvironmentallawsandregulationsinconservationefforts.	I

SYLLABUS

UnitNo	Content	Hours
Unit1	**NatureofEnvironmentalStudiesandImportanceofecosystems.**	
	• Definition,scopeandimportance. • Multidisciplinarynatureofenvironmentalstudies • Needforpublicawareness. **Ecosystem** • Conceptofanecosystem. • Structureand functionofanecosystem. • Producers,consumersanddecomposers. • Foodchains, foodwebsandecologicalpyramids • Introduction,types,characteristicsfeatures,structureandfunctionofthefollowingecosystem a) Forestecosystem,b)Grasslandecosystem,c)Desert ecosystem, d)Aquaticecosystems(ponds,streams,lakes, rivers,oceans,estuaries) • Degradationoftheecosystemsand it‟simpacts.	**06 Hrs.**
Unit2	**NaturalResourcesandAssociatedProblems.**	
	• Forestresources:Useandover-exploitation,deforestation,damsandtheireffectsonforestsandtribalpeople. • Waterresources:Use andover-utilization of surfaceandgroundwater,floods,drought,conflictsoverwater,dams- benefits and problems. • Mineralresources: Usageandexploitation.Environmentaleffectsofextractingandusingmineralresources. • Foodresources:Worldfoodproblem,changescausedbyagriculture,effectofmodernagriculture,fertilizer-pesticide problems. • Energy resources:Growingenergyneeds,renewableandnon-renewableenergy resources,useofalternateenergy sources. Solar energy, Biomass energy. • Landresources:Landasaresource,landdegradation,maninducedlandslides,soilerosionanddesertification. • Roleofindividualsinconservationofnaturalresources.Equitableuseofresourcesforsustainablelifestyles.	**06 Hrs.**
	SocialIssuesandtheEnvironment	

Unit3	• Humanpopulationgrowthandimpact onenvironment. • Environmentalethics: RoleofIndianreligioustraditionsandcultureinconservationoftheenvironment. • Environmentalmovements-ChipkoMovement,AppikoMovement,SilentValleyMovement. • Resettlementandrehabilitationofpeople;itsproblemsandconcerns. • Waterconservation,rainwaterharvesting. Disastermanagement:floods,earthquake,cyclone,tsunamiandlandslides,Casestudies.	**04 Hrs.**
Unit4	**EnvironmentalPollution**	
	• Definition:Causes,effectsandcontrolmeasuresof:Airpollution,Waterpollution,Soilpollution,Marinepollution, Noise pollution, Thermal pollution, Global warming, acid rain, ozone layer depletion. • SolidwasteManagement:Causes,effectsandcontrolmeasuresofurbanandindustrialwastes.Solidwaste management, control & rules, Role ofanindividualinpreventionofpollution	**04 Hrs.**
Unit5	**Biodiversityand its conservation:**	
	• Introduction-Definition:genetic,speciesandecosystemdiversity. • Bio-geographicalclassificationofIndia. • Valueofbiodiversity:consumptiveuse,productive use,social,ethical, aestheticandoptionvalues. • Indiaasamega- diversitynation. • WesternGhatasa biodiversityregion.Hot-spotsofbiodiversity. • Threatstobiodiversity:habitatloss,poachingofwildlife,man-wildlifeconflicts,	**04 Hrs.**
	• Conservationofbiodiversity:In-situandEx-situconservationofbiodiversity.	
	EnvironmentalProtection-Policiesandpractices • EnvironmentProtectionAct. • Air(PreventionandControlofPollution)Act. • Water(Preventionand controlofPollution)Act • WildlifeProtectionAct • ForestConservationAct • NationalandInternationalConventionsandagreementsonenvironment.	**04 Hrs.**

Field work:(Fieldworkisequalto 4lectures) **10 marks**

Note-TheISE/CAiscarriedoutthrough theFieldworkandReportwriting.

- Visittoalocalareatodocumentenvironmentalassetsriver/ forest/grassland/hill/mountain
- Visittoalocalpollutedsite-Urban/Rural/Industrial/Agricultural
- Studyofcommonplants,insects,birds.
- Studyofsimple ecosystems-pond,river,hillslopes,etc.

References:

ReferenceBooks	
1	RautP.D.,"EnvironmentalStudies",ShivajiUniversityPress,2021
2	Gleick,H.,1993,WaterinCrisis, PacificInstituteforstudies inDev., "Environment&Security".StockholmEnv.Institute. OxfordUniv.Press473p
3	HawkinsR.e.,"EncyclopediaofIndianNaturalHistory",BombayNaturalHistorySociety,Bombay(R)
4	Heywood,V.H.&Watson, R.T.1995,"GlobalBiodiversityAssessment",CambridgeUniv. Press1140p.
5	Jadhav,H.&Bhosale, V.M.1995,"EnvironmentalProtectionandLaws", HimalayaPub.House,Delhi284p
6	McKinney,M.L.&School. R.M.1196,"EnvironmentalScienceSystems&Solutions",Webenhancededition,639p
7	MhaskarA.K.,MasterHazardous,"Techno-SciencePublications(TB")

SecondYear(Sem.IV)B.Tech.inElectricalEngineering

VSECEE03412ComputationalMethods

Practical:2Hrs/Week	**ExaminationScheme**
	ISE/CA:50Marks
Credit:1	**Total:** 50 Marks

Objectives:

Labexercises focusonapplyingcomputationaltechniquestosolvereal-worldelectricalengineering problemsusingprogrammingtools like MATLAB, Python etc.

CourseOutcome(CO): Studentableto	
CO1	Analyzelinearandnonlinearalgebraicequationsandsystemsofnonlinearequationsusingnumericaltechniques
CO2	Applynumericalschemesfordifferentiatingand integratingcomplicated functions.
CO3	Understandcomputationalschemesforsolvingsystemsofordinarydifferentialequations.

Sr.No.	TitleofExperiments	CO's	Hrs.
1	Towriteasimpleprogramtocalculate and displaythefactorialofanumber.	**CO2**	**2hrs**
2	Tocreateascripttoplotasineandcosinefunction.	**CO1**	**2hrs**
3	ToImplementaprogramcomparethe resultsofanumericalapproximationwiththeactualvalue.	**CO2**	**2hrs**
4	ToAnalyzetheerrorinnumericaldifferentiationusingfinitedifferences.	**CO2**	**2hrs**
5	ToImplement andcomparetheBisectionmethodandNewton-Raphson"smethodtofindrootsofanonline areequations.Graphtheconvergence ofeach method.	**CO1**	**2hrs**
6	TostudyTrapezoidalruleandSimpson"sruletoestimatetheintegralofafunction.Compareresultswiththe analyticalsolution.	**CO1**	**2hrs**

7	Towriteaprogramcomputederivativesusingforward, backward,andcentraldifferencemethods.Analyze theaccuracyofeachmethod.	**CO3**	**2hrs**
8	ToImplementGaussianeliminationtosolve linearequations. UseLUdecompositiontosolveagiven system andanalyzetheefficiency.	**CO2**	**2hrs**
9	ToImplementLagrangeinterpolationforasetofdatapoints.Compareitwithsplineinterpolationand visualizethe results.	**CO3**	**2hrs**
10	ToImplementgradientdescenttominimizeasimplefunction.Applyconstrainedoptimizationtechniquesto anengineering problem.	**CO3**	**2hrs**
11	TouseEuler'smethodandtheRunge-Kuttamethodtosolveafirst-orderODE.Comparetheresultswith analyticalsolutions.	**CO2**	**2hrs**
12	ToImplementthefinitedifferencemethodforasimpleheatequation.Visualizethetemperaturedistribution overtime.	**CO1**	**2hrs**
13	Chooseacasestudyfrompower systems,controlsystems,orcommunicationsystems. Analyze datausing computationalmethodsandpresentfindings.	**CO3**	**2hrs**

Textbook

1. NumericalMethodsforEngineers, StevenChapraandRaymondCanale,SeventhEdition, McGrawHill, 2015.
2. AppliedNumericalAnalysis,LaureneFausett,SecondEdition,Pearson,2008.
3. AdvancedEngineeringMathematics,ErwinKreyszig,TenthEdition,Wiley,2011.

ReferenceBooks

1. M.K.Jain,S.R.K.IyengarandR.K.Jain,NumericalmethodsforScientificandEngineeringComputation,NewAgeInternational Publishers, Fifth edition, 2007.

2. C.FGeraldandP.OWheatleyAppliedNumericalAnalysis,SeventhEdition,AddisonWesley,2009.RizwanButt,Introductionto NumericalAnalysisUsingMATLAB, JonesandBartlettPublisher,2010.AbdelwahabKharab, RonaldB, AnIntroductiontoNumerical Methods: A MATLAB Approach, Third Edition, CRC Press, 2012.

MappingofCOsandPOs

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1	-	-	-	-	-	-	2
CO2	2	2	3	3	3	1	-	-	1		2	2
CO3	2	2	3	3	3	1	-	-	1		2	3

1:Slight(Low)2:Moderate(Medium)3:Substantial(High)

EquivalenceofSubjectsbetweenCBCSandNEPfor

S.Y.B.Tech(Sem.-III&IV)

NameofProgramme: ElectricalEngineering

Class:S.Y. B.Tech Semester-III

Sr. No.	Name ofSubjects in existing CBCS2018onwards pattern (Addallsubjects)	NameofSubjectsinNEP Pattern	Reason	Remark
01	EngineeringMathematics-III	-	-	Addednewsubjects(Sr.No.07to11)
02	ElectricalEngineeringMaterials AndEnergyConversion	-	-	
03	AnalogElectronicsEngineering	-	-	
04	BasicCircuit Theory	ElectricalCircuit Analysis		AllcontentisinaccordancewiththeBasic CircuitTheoryasperthe CBCS2018pattern.
05	ElectricalMeasurement	ElectricalMeasurementand Instrumentation		95percentcontentisinaccordancewiththe ElectricalMeasurementaspertheCBCS2018 pattern
06	CProgramming	-		-
07		SignalsandSystems		Addednew subject
08		UniversalHumanValues		Addednew subject
09		SoftSkillDevelopment		Addednew subject
10		OpenElective-01		Addednew subject
11		Multi-disciplinaryMinor–01		Addednew subject

Class:S.Y.B.Tech Semester-IV

Sr. No.	Name ofSubjects inexisting CBCS 2018onwardspattern (Addallsubjects)	NameofSubjects inNEP Pattern	Reason	Remark
01	DCMT	DCMachineand Transformer		Allcontentisinaccordancewiththesubject DCMTaspertheCBCS 2018pattern.
02	PowerElectronics	-		-
03	PowerSystem-I	-		-
04	Electromagnetic	ElectromagneticEngineering		All content is in accordance with the subject ElectromagneticaspertheCBCS2018pattern.
05	ControlSystem–I			-
06	EnvironmentalStudies	EnvironmentalScience		Changeinthesubjecttitle i.e.EnvironmentalScience
07		AnalogandDigitalElectronics		Addednew subject
08		StrategicManagement		Addednew subject
09		ProfessionalEthics		Addednew subject
10		SoftwareProgrammingfor Electrical Engineering		Addednew subject
11		ComputationalMethods		Addednew subject
12		OpenElective-02		Addednew subject
13		Multi-disciplinaryMinor–02		Addednew subject

DepartmentofElectricalEngineering

ExitCourseforElectricalEngineeringafter2nd Year

Exitoption:AwardofUGDiplomainMajorwith88credits andanadditional8credits from Following Exit Courses				
Sr. No	**CourseCode**	**CourseTitle**	**Mode**	**Credits**
1		RepairingandMaintenanceofElectricalAppliances	Analogous Online/offline certification Course or industrialtrainingoftotal8 credits	8
		OR		
2		InstallationandMaintenanceofIndustrialElectricalSystems		8

1. Studentsmayselectmultiplecoursesfromthelistprovidedtofulfilltherequiredcredits.
2. ToenrollinanNPTELcourse,visit https://swayam.gov.in,register,andcreateanaccount.Afterlogging in, jointhedesiredcourse and follow the provided instructions to complete it.
3. PleasenotethattheavailabilityofNPTELcoursesissubject to changedueto regularupdates. Ifalisted courseisunavailable, students may opt for an equivalent course ofsimilar duration and subject matter, with prior approval fromthe concerned institute.
4. If a student is unableto completethe NPTEL/MOOC onlinecourse,theyare requiredto appear foraComputer-Based Examination (MCQand MSQ format) conducted byShivajiUniversity, based onthecontentoftheNPTEL/MOOCcourseselected bythestudent.

Examinationschemeforfirst yearexit:

- Themarksobtainedfromthe MOOCswill bescaledtoatotalof100marks.

ListofNPTEL/MOOCs Course

Certificate Course in Repairing and Maintenance of Electrical Appliances and CertificateCourseonInstallationandMaintenanceofIndustrialElectricalSystems

Sr.No.	**NPTELCourseTitle**	**Duration**	**Credits**
01	DomesticEquipmentMaintenance	12weeks	03
02	ElectricityandElectricalWiring(EEW)	12weeks	03
03	MaintenanceandTestingofElectricalMachines	12weeks	04