University of Mumbai

No. AAMS_UGS/ICC/2022-23/ 113

CIRCULAR :-

Attention of the Principals of the Affiliated Colleges and Directors of the recognized Institutions in Faculty of Science & Technology is invited to this office circular No.UG/137 of 2016-17 dated 9th November, 2016 relating to the revised syllabus of M.E.(Power Electronics and Drives) (Sem.– I to IV) (CBCS) (REV-2022 Scheme).

They are hereby informed that the recommendations made by the Board of Studies in Electrical Engineering at its meeting held on 09th May, 2022 and subsequently passed in the Faculty and then by the Board of Deans at its meeting held on 23rd June, 2022 vide item No. 6.22 (R) have been accepted by the Academic Council at its meeting held on 11th July, 2022 **vide** item No. 6.22 (R) and that in accordance therewith, the revised syllabus of M.E.(Power Electronics and Drives) (Sem.– I to IV) (CBCS) (REV-2022 Scheme) has been brought into force with effect from the academic year 2022-23. (The circular is available on the University's website www.mu.ac.in).

(Dr. Shailendra Deolankar)
I/c Registrar

MUMBAI – 400 032
20th October, 2022

To

The Principals of the Affiliated Colleges and Directors of the recognized Institutions in Faculty of Science & Technology.

A.C/6.22(R)/11/07/2022

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No. AAMS_UGS/ICC/ 2022-23/ 113

20th October, 2022

Copy forwarded with Compliments for information to:-

1) The Dean, Faculty of Science & Technology,
2) The Chairman, Board of Studies in Electrical Engineering,
3) The Director, Board of Examinations and Evaluation,
4) The Director, Board of Students Development,
5) The Director, Department of Information & Communication Technology,
6) The Co-ordinator, MKCL.

(Dr. Shailendra Deolankar)
I/c Registrar

Copy for information and necessary action :-

1. **The Deputy Registrar, College Affiliations & Development Department (CAD),**
2. **College Teachers Approval Unit (CTA),**
3. **The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),**
4. **The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA)**
5. **The Deputy Registrar, Research Administration & Promotion Cell (RAPC),**
6. **The Deputy Registrar, Executive Authorities Section (EA)**
   He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
7. **The Deputy Registrar, PRO, Fort, (Publication Section),**
8. **The Deputy Registrar, Special Cell,**
9. **The Deputy Registrar, Fort Administration Department (FAD) Record Section,**
10. **The Deputy Registrar, Vidyanagari Administration Department (VAD),**

Copy for information :-

1. **The Director, Dept. of Information and Communication Technology (DICT), Vidyanagari,**
   He is requested to upload the Circular University Website
2. **The Director of Department of Student Development (DSD),**
3. **The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,**
4. **All Deputy Registrar, Examination House,**
5. **The Deputy Registrars, Finance & Accounts Section,**
6. **The Assistant Registrar, Administrative sub-Campus Thane,**
7. **The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,**
8. **The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,**
9. **P.A to Hon'ble Vice-Chancellor,**
10. **P.A to Pro-Vice-Chancellor,**
11. **P.A to Registrar,**
12. **P.A to All Deans of all Faculties,**
13. **P.A to Finance & Account Officers, (F & A.O),**
14. **P.A to Director, Board of Examinations and Evaluation,**
15. **P.A to Director, Innovation, Incubation and Linkages,**
16. **P.A to Director, Department of Lifelong Learning and Extension (DLLE),**
17. **The Receptionist,**
18. **The Telephone Operator,**

Copy with compliments for information to :-

19. **The Secretary, MUASA**
20. **The Secretary, BUCTU.**

AC– 11/07/2022
Item No.– 6.22 (R)

University of Mumbai

Revised Syllabus for
M.E. (Power Electronics and Drives)

(Semester – I to IV)

(Choice Based Credit System)

(With effect from the academic year 2022-23)

University of Mumbai

Syllabus for Approval

O:_____ Title of Course	M.E. (Power Electronics and Drives)
O:_____ Eligibility	After Completing Graduation in Engineering as per the Ordinance 0.6243
R:_____Passing Marks	45%
No. of years/Semesters:	Years- 2 / Semesters - 4
Level:	P.G.
Pattern:	Semester
Status:	Revised
To be implemented from Academic Year:	From the academic year 2022-23

Dr. Sushil Thale
Chairman,
Board of Studies in
Electrical Engineering

Dr. Suresh K. Ukarande
Associate Dean,
Faculty of Science and
Technology

Dr Anuradha Majumdar
Dean,
Faculty of Science and
Technology

Preamble

To meet the challenge of ensuring excellence in engineering education, the issue ofquality needs to be addressed, debated and taken forward in a systematic manner.Accreditation is the principal means of quality assurance in higher education. The majoremphasis of accreditation process is to measure the outcomes of the program that isbeing accredited. In line with this Faculty of Science and Technology (in particularEngineering) of University of Mumbai has taken a lead in incorporating philosophy ofoutcomebasededucationintheprocessofcurriculum development.

Faculty resolved that course objectives and course outcomes are to be clearly definedfor each course, so that all faculty members in affiliated institutes understand the depthand approach of course to be taught, which will enhance learner's learning process.Choice based Credit and grading system enables a much-required shift in focus fromteacher-centrictolearner-centriceducationsincetheworkloadestimatedisbasedontheinvestmentoftimeinlearningandnotinteaching.Italsofocusesoncontinuousevaluation which will enhance the quality of education. Credit assignment for courses isbasedon15weeksteachinglearningprocess,howevercontentofcoursesistobetaughtin 13 weeks and remaining 2 weeks to be utilized for revision, guest lectures, coverageofcontent beyond syllabus etc.

There was a concern that the earlier revised curriculum more focused on providinginformation and knowledge across various domains of the said program, which led toheavily loading of students in terms of direct contact hours. In this regard, faculty ofscience and technology resolved that to minimize the burden of contact hours, totalcreditsofentireprogramwillbeof170,whereinfocusisnotonlyonprovidingknowledgebutalsoonbuildingskills,attitudeandself-learning.Therefore,inthepresentcurriculumskill based laboratories and mini projects are made mandatory across all disciplines ofengineering in second and third year of programs, which will definitely facilitate self-learning of students. The overall credits and approach of curriculum proposed in thepresentrevision is in line with AICTEmodel curriculum.

The present curriculum will be implemented for Master of Engineering in ElectricalEngineering(PowerElectronics andDrives)fromtheacademicyear2022-23.

Signature: **Signature:**

Chairman,BoardofStudies **Facultyof Dean**

ProgramStructurefor
M.E.ElectricalEngineering(PowerElectronicsandDrives)
University of
Mumbai(WithEffectfrom202
2-2023)
SemesterI

Course Code	CourseName	TeachingScheme(Contact Hours)			CreditsAssigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
PEDC101	ElectricalDrivesandits Application	3	--	--	3	--	--	3
PEDC102	PowerElectronic Converters	3		--	3		--	3
PEDPE101X	ProgramElective1	3	--	--	3	--	--	3
PEDPE102X	ProgramElective2	3	--	--	3	--	--	3
PEDIE101X	InstituteElective1	3	--	--	3	--	--	3
PEDL101	Drives AndControlLab	--	2	--	--	1	--	1
PEDSBL101	Skill Based Lab-IPowerElectronics DesignLab-I	--	4$	--	--	2	--	2
Total		**15**	**06**	**--**	**15**	**03**	**--**	**18**

Course Code	CourseName	ExaminationScheme							
		Theory					Term Work	Pract /Oral	Total
		InternalAssessment			End Sem. Exam	Exam.Duration(in Hrs)			
		Test-1	Test-2	Avg					
PEDC101	ElectricalDrivesand Application	20	20	20	80	3	--	--	100
PEDC102	PowerElectronic Converters	20	20	20	80	3	--	--	100
PEDPE101X	ProgramElective1	20	20	20	80	3	--	--	100
PEDPE102X	ProgramElective2	20	20	20	80	3	--	--	100
PEDIE101X	InstituteElective1	20	20	20	80	3	--	--	100
PEDL101	Drives AndControlLab	--	--	--	--	--	25	25	50
PEDSBL101	Skill Based Lab-IPowerElectronics DesignLab-I	--	--	--	--	--	50	50	100
Total		**--**	**--**	**100**	**400**	--	**75**	**75**	**650**

SubjectCode	ProgramElectiveCourse-1	Subject Code	ProgramElectiveCourse-2
PEDPE1011	MachineLearningTechniquesin PowerSystem	PEDPE1021	DigitalSignalController
PEDPE1012	PowerQualityinPowerSystem	PEDPE1022	Micro-gridTechnology
PEDPE1013	ElectricVehicleTechnology	PEDPE1023	IoTapplicationinElectricalEngineering

ProgramStructurefor
M.E.ElectricalEngineering(PowerElectronicsandDrives)
University of
Mumbai(WithEffectfrom2022-2023)
SemesterII

Course Code	CourseName	TeachingScheme(ContactHours)			CreditsAssigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
PEDC201	AdvancedPower Electronics	3	--	--	3	--	--	3
PEDC202	DigitalControlof ElectricalDrives	3		--	3		--	3
PEDPE201X	ProgramElective3	3	--	--	3	--	--	3
PEDPE202X	ProgramElective4	3	--	--	3	--	--	3
PEDIE201X	InstituteElective2	3	--	--	3	--	--	3
PEDL201	DSP ApplicationsLab	--	2	--	--	1	--	1
PEDSBL201	Skill Based Lab-IIPowerElectronics DesignLab-II	--	4$	--	--	2	--	2
Total		**15**	**06**	**--**	**15**	**03**	**--**	**18**

Course Code	CourseName	ExaminationScheme							
		Theory					Term Work	Prac/ Oral	Total
		InternalAssessment			End Sem.Exam	Exam.Duration (inHrs)			
		Test-1	Test-2	Avg					
PEDC201	AdvancedPower Electronics	20	20	20	80	3	--	--	100
PEDC202	DigitalControlof ElectricalDrives	20	20	20	80	3	--	--	100
PEDPE201X	ProgramElective3	20	20	20	80	3	--	--	100
PEDPE202X	ProgramElective4	20	20	20	80	3	--	--	100
PEDIE201X	InstituteElective2	20	20	20	80	3	--	--	100
PEDL201	DSPApplicationsLab	--	--	--	--	--	25	25	50
PEDSBL201	Skill Based Lab-IIPowerElectronics DesignLab-II	--	--	--	--	--	50	50	100
Total		**--**	**--**	**100**	**400**	--	**75**	**75**	**650**

Note 1: Skill Based Lab- I and II are focused on the learning through experience. SBL shall facilitate thelearner to acquire the fundamentals of practical engineering in his or her specialization in aproject-oriented environment. The learning through skill based labs can be useful in facilitatingtheirresearchworkandhenceusefulinearlycompletionoftheirdissertationwork.

SubjectCode	ProgramElectiveCourse-3	Subject Code	ProgramElectiveCourse-4
PEDPE2011	PowerElectronicsinPowerSystems	PEDPE2021	DesignofElectricVehicleSystem
PEDPE2012	IndustrialLoadModelingandControl	PEDPE2022	DesignofPowerElectronicConverters
PEDPE2013	DSPApplicationsinPowerConversion Systems	PEDPE2023	PowerConvertersforRenewableEnergy Sources

ProgramStructurefor
M.E.ElectricalEngineering(PowerElectronicsandDrives)
University of
Mumbai(WithEffectfrom202
2-2023)

SemesterIII

CourseCode	CourseName	TeachingScheme (ContactHours)			CreditsAssigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
XXMP301	MajorProject: Dissertation-I	--	20	--	--	10	--	10
Total		**00**	**20**	**00**	**00**	**10**	**--**	**10**

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	Exam.Duration (inHrs)			
		Test-1	Test-2	Avg					
XXMP301	MajorProject: Dissertation-I	--	--	--	--	--	100	--	100
Total		**--**	**--**	**--**	**--**	--	**100**	**--**	**100**

OnlineCreditCourses

CourseCode	CourseName	Teaching Scheme(Contact Hours)			CreditsAssigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
XXOCC301	OnlineCreditCourse -I	--	--	--	--	--	--	3
XXOCC301	OnlineCreditCourse -II	--	--	--	--	--	--	3
Total		**--**	**--**	**--**	**00**	**00**	**00**	**06**

Note 2: It is mandatory to complete the Online Credit Courses (OCC) available on NPTEL / Swayam /MOOC orsimilarplatformapprovedbyUoM.Thesetwocoursesshallbecompletedinanysemesterlorlllorlll,butnot later end of the Semester III.University shall make a provision that credits earned with OCC- I andOCC-II shall be accounted in the third semester grade-sheet with actual names of courses. The learnershall be allowed to take up these courses from his or her institute or organisation/ industry where his /her major project is carried out. The students shall complete the courses and shall qualify the examconductedbytherespectiveauthorities/instructorfromtheplatform.Thefeesforanysuchcoursesandth ecorrespondingexaminationshall bebornebythe learner.

OnlineCreditCourse–I
ThelearnershalloptfortheCourseinthedomainofResearchMethodology**or**Research&PublicationEthicsor IPR. Theopted course shallbeof3 creditsofequivalent numberofweeks.

OnlineCreditCourse–II

Thelearnershalloptforthecourserecommendedby FacultyAdvisor/ProjectSupervisorfromtheinstitute.Theoptedcourseshallbeof3 creditsof equivalent numberofweeks.

ProgramStructurefor
M.E.ElectricalEngineering(PowerElectronicsandDrives)
University of
Mumbai(WithEffectfrom2022-2023)
SemesterIV

CourseCode	CourseName	TeachingScheme (ContactHours)			CreditsAssigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
XXMP401	Major Project:Dissertation-II	--	32	--	--	16	--	16
Total		--	32	--	--	16	--	16

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	Exam.Duration (inHrs)			
		Test-1	Test-2	Avg					
XXMP401	MajorProject: Dissertation-II	--	--	--	--	--	100	100	200
Total		--	--	--	--	--	100	100	200

Note3: TheDissertation-IIsubmissionshallnotbepermittedtillthelearnercompletesalltherequirementsMEcourse.

Note4: Thecontact hoursfor the calculationofloadoftheteacherforMajorProject areas follows:MajorProjectDissertationI andII -02Hour/week/student

InstituteElectives#

Subject Code	InstituteElectiveCourse-I	Subject Code	InstituteElectiveCourse-II
PEDIE1011	ProductLifecycleManagement	PEDIE2011	ProjectManagement
PEDIE1012	ReliabilityEngineering	PEDIE2012	FinanceManagement
PEDIE1013	ManagementInformationSystem	PEDIE2013	EntrepreneurshipDevelopment and Management
PEDIE1014	DesignofExperiments	PEDIE2014	HumanResource Management
PEDIE1015	OperationResearch	PEDIE2015	ProfessionalEthicsandCSR
PEDIE1016	CyberSecurityandLaws	PEDIE2016	ResearchMethodology
PEDIE1017	DisasterManagementandMitigation Measures	PEDIE2017	IPR andPatenting
PEDIE1018	EnergyAuditandManagement	PEDIE2018	DigitalBusinessManagement
PEDIE1019:	DevelopmentEngineering	PEDIE2019	EnvironmentalManagement

#Commonwithallbranches

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDC101	ElectricalDrives andApplication	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDC101	ElectricalDrives andApplication	20	20	20	80	3	-	-	100

CourseObjectives	**Toimpartknowledgeon** 1. Modellingandcontrolofvariousmachines 2. ElectricDrivesinvariousapplications
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeable:** 1. Todevelopmathematicalmodelofanelectricalmachine. 2. To analysescalarcontrolschemes ofinductionmotor. 3. Toanalysevectorcontrolschemesofinductionmotor. 4. To analysethecontrolofPMSM,SyRM andBLDCmotors. 5. Toidentifythemotors,powermodulatorsandthecontrolschemesusedinvariousapplications.

Module	Details	Hours
1	**ElectricalMachineModelling:** Modelling of DC Machine: Voltage and Torque equations, Time domain block diagram of DCshuntMachine,ModellingofACMachine:ThreePhasetoTwoPhaseTransformation,InverseTransformation, commonly used Reference Frames. Voltage and Torque equations, Dynamicmodelof InductionMachine.	08
2	**ScalarControlofInductionMotor:** Variable voltage and Variable Frequency Operation of Three Phase Symmetrical InductionMachine, Drive Operating Regions, Different Scalar Control Schemes with block diagrams(VoltagefedInverter Control andCurrentfedInverterControl)	06
3	**VectorControlandDirectTorqueControlofInductionMotor:** Introduction, Direct or Feedback Vector Control, Flux Vector Estimation, Indirect or FeedForwardVectorControl,StatorFluxOrientedVectorControl,SensorlessVectorControl,Direct Torque andFluxControl(DTC), AdaptiveControl:MRAC,Fuzzy logiccontrol	08
4	**ControlofPMSM,BLDCMotorandSynchronousReluctanceMotor(SyRM):** PMSM:V/Hzcontrol,Self-ControlModel,Vectorcontrol,SpeedControlofBLDCMotor.Constructiondetails andspeedcontrol ofSyRM	06
5	**DomesticandIndustrialApplications:** DomesticapplicationsofDrivesandControl:Ceilingfanwithsinglephaseinductionmotor/BLDCmotor,Refrigerator, WashingMachine,Air Conditioner,Mixergrinder. IndustrialApplication:DrivesinCementfactory,SteelIndustry,RollingMills,Pumps,Blower Fans,Conveyors,CranesandLifts	06
6	**ElectricalDrivesinElectricVehicleApplications:** BlockDiagramofatypicalEVpowertrain.Power/EnergySupplyRequirementsforEVapplications, MachinesusedforPropulsionApplicationsandBasicControlSchemes-InductionMotor,PMSM,BLDCmotor, SyRM, SRM.	05

TextBooks:-

1. ModernPower ElectronicsandA.C.Drives,B.K. Bose,PrenticeHallPTR.
2. ElectricMotorDrives:Modeling, Analysis andControl,Krishnan.R,PHI.
3. FirstCourseonElectricalDrivesby S.K.Pillai,NewAge International
4. ElectricalDrives:ConceptsandApplicationsbyVedamSubramanyam,T.M.H

ReferenceBooks:-

1. AnalysisofElectricMachineryP.C.Krause,McGraw Hill,NewYork
2. PowerSemiconductor ControlledDrives, G.K.Dubey,Prentice-HallInternational.
3. D. W. Novotny and T. A. Lipo, Vector Control and Dynamics of AC Drives, Oxford University Press,1996.
4. PowerElectronicsbyMuhammadH.Rashid,Pearson
5. ControlofElectricaldrives,W.Leonhard,Springer-Verlag.
6. JohnChiasson,ModellingandHighPerformance ControlofElectricMachines, Wiley-IEEEPress,2005.
7. I.Boldea,S.A.Nasar, Vector ControlofACDrives, CRC Press,1992.

Assessment:

Internal Assessment consists of two tests out of which; one should be compulsory class test (on minimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDC102	**Power ElectronicConverters**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDC102	**PowerElectronic Converters**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

CourseObjectives	1. To understand and acquire knowledge about various power semiconductor devices related toitscharacteristics,ratings,protectionandtoselectsemiconductordevicesforvariousapplications. 2. To introduce different methods of power conversion such as ac to dc, dc to dc, dc to ac theunderlying principles of converter operation and hence to analyze different converter circuitsforpowerconversion. 3. To keep abreast with the latest technologies and research going on in different areas related topowerelectronics. 4. Toenhance the capabilityofproblemsolvingskills.
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto** 1. Selectanddesignpowerelectronicconvertertopologiesforabroadrangeofenergyconversionapplications. 2. Abilitytoanalyzevarioussinglephaseandthreephasepowerconvertercircuitsandunderstandtheirapplications. 3. Apply the basic concepts of power electronics to design the circuits in the fields of AC and DCdrives,powergenerationandtransmissionandenergyconversion,industrialapplications,extractionofenergyfromrenewablesources. 4. Determine the drive circuit requirements in terms of electrical isolation and design heat sink,snubbercircuit for protection

Module	Details	Hours
1	**PowerSemiconductorDevices** Reviewof PowerDevices:SCR,BJT,MOSFET,IGBT, Safeoperating Limits,selectionofdevicesforvariousapplications,ConductionandSwitchinglosses,numericals, Wideband gapdevices(WBC):SiC,GaNdevices.	07
2	**DriveCircuitsandProtection:** Gatedriverequirements,Typesofdrivercircuits,DriverICs,DrivercircuitrequirementsforWBC devices. Protection circuits: Snubber circuits and its design, temperature control andheat-sinks, numericals.	06
3	**DCtoDCConverters** Analysis of various conduction modes of 2^{nd} order converters: Buck, Boost, Buck-Boostconverters,Introductionto4^{th}orderconverters:CukandSEPICconvertersinCCM,waveforms, output voltage derivation, comparison of dc to dc converters, numericals,Introductiontointerleaveddc-dc converters.	08
4	**PowerfactorandpowerdecouplinginRectifiers** Causes for poor power factor in diode rectifiers, effect of power factor on firing angle inthyristorrectifiers,SinglephasePWMrectifiersanditsapplications,Powerfactorimprovementusing DC-DCconverters.	06

	Needforpowerdecouplinginsinglephaserectifiers,singlephasepowerdecoupling techniquesinrectifiers.	
5	**DCtoACConverters andModulationStrategies:** OutputwaveformsofsingleandThreephaseVSI,blanking/deadtimerequirement,harmonicanalysisofloadvoltage,Currentsourceinverters,comparisonofVSIandCSI, numericals.	06
6	**PWMModulationStrategies**: SinglephaseSinusoidalPWM(unipolar,bipolar),effectofamplitudeandfrequencymodulationindex,Hysterisis PWM,ThreephaseSPWM, Spacevectormodulation.	06

TextBooks:

1. N. Mohan, T. M. Undeland, W.P Robbins, Power Electronics, Converters, Applications & Design, WileyIndia Pvt.Ltd.
2. M.H.Rashid,HandbookofPowerElectronics",AcademicPress,2001.
3. Daniel.W.Hart,"PowerElectronics",McGrawHillPublications2010.
4. JosephVithayathil,PowerElectronics,TataMcGrawHill.
5. P.SBhimbra,"PowerElectronics",KhannaPublishers.
6. SimonAng,AlejandroOliva,"Power-SwitchingConverters"TaylorandFrancisgroup
7. RWEricksonandDMaksimovic,FundamentalofPower ElectronicsSpringer,2ndEdition.

References/Journals

1. P.T.Krein,ElementsofPowerElectronics,OxfordUniversityPress.
2. L.Umanad,"PowerElectronics:Essentials& Applications,"Wiley.
3. IEEE Transaction journals, IECON, APEC and other power electronic related Conference Proceedingsetc.

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfrom allthemodules.

ME(ElectricalEngineering)inPowerElectronicsandDrives-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(ContactHours)**		**CreditsAssigned**		
PEDPE1011	**MachineLearning Techniques inPowerSystem**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDPE1011	**MachineLearningTechniques in PowerSystem**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

CourseObjectives	1. Understandthemotivationfordifferentmachinelearningalgorithmsandselecttheappropriatealgorithmfor agiven problem 2. Usethebackpropagationalgorithmtocalculateweightgradientsinafeedforwardneuralnetworkby hand 3. Writeamachinelearning algorithmfromscratchusingPythonlibraries,andanalyseitsperformance.
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Compareand contrastpros and cons of various machinelearning techniquesand togetaninsightofwhen toapplyaparticularmachinelearningapproach. 2. Illustratethe importanceofDecisiontreealgorithmsinmachine learning 3. Analyseandimplementvariousmachinelearningapproachesandparadigmsusingpythonlibraries. 4. Extractfeaturesthatcanbeusedforaparticularmachinelearningapproachinvariousapplicationsin electrical engineering.

Module	Details	Hours
1	**Introduction to machine learning:** Impact in daily lives. Brief history of Machin learning.Machinelearningtechniques:Supervised,Unsupervised,Reinforcement,NeuralNetwork.Train and test methodology, Issues in Machine Learning, Overfitting, Machine learningversusArtificialIntelligence,EthicsinAI,IntroductiontoPython,LibrariesforMachine learning.	04
2	**DecisionTree:**Introduction,Decisiontreerepresentation,appropriateproblemsfor decision tree learning, basic decision tree algorithm, hyperspace search in decision treelearning,issues in decisiontreelearning.	06
3	**SupervisedLearning:**Regression,LinearRegression,MultilinearRegression,LogisticRegression,Best fit line,DecisionLine,Regressionmodel in Python.	06
4	**Clustering&UnsupervisedLearning:**Learningfromunclassifieddata.Clustering,HierarchicalAgglomerativeClustering.K-meansclustering.Expectationmaximization(EM)forsoftclustering.Semi-supervisedlearningwithEMusinglabelledandun-labelleddata, clusteringmodelinPython.	08
5	**ArtificialNeuralNetwork:**Introduction,FeedForwardNeuralNetworks,basicneuralnetworkstructure,ThePerceptron,forwardpropagation,costfunctions,nonlinear function,Multilayernetwork.	09
6	**BackpropagationAlgorithmandApplications:**backpropagation,error,trainingby gradientdescent,bias/varianceandunder/overfitting,regularization,ANNmodelin	06

	Python,Applicationsofmachinelearninginelectricalengineering:smartgrid,renewable energygeneration,Forecasting.	

TextBooks:

1. IntroductiontoMachineLearningwithPython:AGuideforDataScientistsbyAndreasC.Mueller,SarahGuido, Publishedby O'Reilly Media, Inc.
2. Introductionto ArtificialNeuralSystemsJacekM.Zurada,JAICOPublishingHouseEd.2006.
3. NeuralNetworkDesign,SecondEdition,MartinT.Hagan,HowardB.Demuth,MarkHudsonBeale,andOrland oDeJesús, 2014.

ReferenceBooks:

1. Introductionto MachineLearning,ByEthemAlpaydin
2. NeuralNetworksaComprehensiveFoundations,SimonSHaykin,PHIEdition,

Assessment:
InternalAssessmentconsistsof twotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:
1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDPE1012	**Power Quality inPowerSystem**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDPE1012	**PowerQualityin PowerSystem**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

CourseObjectives	**Toimpartknowledgeon** 1. Variouspowerqualityissues,itcausesandeffects 2. Effectsof harmonics duetonon-linearload 3. Mitigationmethodsforharmonics
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto** 1. Identifyvariouspowerqualityissues, itscauses andeffects. 2. Identifyandanalysetheharmonicscreateddue tononlinearload. 3. Analysethe powerfactor compensationforlinearandnonlinearloads. 4. Understandvariouspowerqualitymitigationtechniques. 5. Identifyvariouspowerqualityissues indistributedgenerationsystem. 6. Understandpower qualitymeasuringequipmentandmonitoringstandards

Module	Contents	Hours
1	**Introduction:** Sources and Effects of power quality problems, types of power quality disturbances - Voltage sag (or dip), Swell, Transients, short duration voltage variation, long durationvoltagevariation,voltage imbalance,waveformdistortion,andvoltageflicker.	06
2	**FundamentalsofHarmonics:** Harmonic Distortion, Voltage versus Current Distortion, Harmonics versus Transients,Harmonic Sources from Commercial Loads, Harmonic Sources from Industrial Loads,LocatingHarmonicSources,SystemResponseCharacteristics,EffectsofHarmonicDistortion,Inter-harmonics	06
3	**PowerQualityEvaluation:** IEEEguidelines,Standardsandrecommendedpractices,Harmonics mechanism ofharmonic generation, harmonic indices (THD, TIF, DIN, C – message weights) PowerQualityCostsEvaluation,Harmonicsources,Switchingdevices,arcingdevices,saturable devices.EffectsofPowerSystem,harmonicsonPowerSystemequipmentandloads.	06
4	**PowerFactorCompensationinlinearcircuits:** LinearcircuitswithSinusoidalSupply-Basicrelationship,complexpower,apparentpower,powerfactorandpowerfactorcompensation Linearcircuitswithnon-SinusoidalSupply-Basicrelationship,complexpower,apparent power,powerfactorandpowerfactorcompensation.	06
5	**PowerFactorCompensationinnon-linearcircuits:** Non-Linear circuits with Sinusoidal Supply-Basic relationship, complex power, apparentpower,power factor and power factorcompensation. Non-Linearcircuitswithnon-SinusoidalSupply-Basicrelationship,complexpower, apparentpower,powerfactorandpowerfactorcompensation.	07

6	**PowerQualityMitigationTechniques:** PassiveFilters,ShuntActiveFilters,SeriesActiveFilters,UnifiedPowerQuality Compensators	08

TextBooks:

1. RogerC.Dugan,MarkF.McGranaghanandH.WayneBeaty,—ElectricalPowerSystemQuality,MCGrawHill
2. G.T.Heydt,ElectricPowerQuality, StarsinaCirclePublications
3. J.Arrillaga,N.R.WatsonandS.Chen,PowerSystemQuality Assessment,JohnWiley& Sons
4. W.ShepherdandP.Zand,Energyflowandpowerfactorinnon-sinusoidalcircuits,CambridgeUniversityPress
5. IEEE-519:1992,IEEERecommendedPracticesandRequirementsforHarmonicControlinElectricPowerSystems
6. BhimSingh,AmbrishChandra,KamalAl-Haddad,PowerQuality:ProblemsandMitigationTechniques,JohnWiley &Sons,FirstEdition2015

ReferenceBook/Journals:

1. JosArrillaga,B.C.Smith,NevilleRWatsonandA.R.Wood,PowerSystemHarmonicsAnalysis, Wiley1997
2. MathH.J.Bollen,UnderstandingPowerQualityProblems,VoltageSagandInterruptions,Wiley-IEEEPress
3. Selected researchpapersinIEEETransactionsonPowerSystems,IEEE Transactionson PowerDelivery,andIEEE TransactiononPower Quality

Assessment:

InternalAssessmentconsistsof twotestsout ofwhich;one should becompulsoryclass test(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDPE1013	**Electric VehicleTechnology**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

Subjectcode	**SubjectName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDPE1013	**Electric Vehicle Technology**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

CourseObjectives	Toimpartknowledgeon 1. Knowthehistoryofelectrichybridelectricvehicles(EV&HEV)and 2. emphasizetheneedandimportanceofEV-HEVfor sustainablefuture. 3. Introducethefundamentalconceptsandprinciplesofelectricandhybridelectricvehiclesdrivetraintopologies. 4. DevelopathoroughunderstandingofthekeyelementsofEV/HEV:ElectricMachinesforPropulsionApplicationsand Energy Sources 5. Model,analyzeanddesignelectricandhybridelectricvehiclesdrivetrainandtounderstandenergy managementstrategies
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeable: 1. Toidentifyanddescribethehistoryandevolvementofelectric&hybridelectricvehiclestoemphasizeontheneed andimportanceofEV/HEVfor sustainablefuture. 2. ToidentifyanddescribetheprinciplesofvariousEV/HEVsdrivetraintopologiesalongwiththeirpowerflowcontrol and fuel efficiency estimation.\ 3. TodesignandselectelectricpropulsionsystemcomponentsforEV/HEVdrivessuitabilityforthedesirableperformanceand control. 4. To compare and evaluate various energy sources and energy storage components for EV and HEVapplications. 5. Tomodel,analyzeanddesign EV/HEVdrivetrainwithenergymanagement strategies. 6. Torecognizetheneedtoadaptandengagein operationsEV/HEVwiththeabsolutetechnological changeinthetransportationsystemforsustainablefuture.

Module	Contents	Hours
1	**Introduction:** ConventionalVehicles:BasicsofvehicleperformanceVehiclepowersourcecharacterization,transmissioncharacteristics,mathematicalmodelstodescribevehicleperformance.HistoricalbackgroundofEV/HEV.Currentstateoftheartin EV/HEVtechnology.	05
2	**HybridElectricVehicles:** History of hybrid and electric vehicles, social and environmental importance of hybridandelectricvehicles,impactofmoderndrive-trainsonenergysupplies.HybridElectricDrive-trains:Basicconceptofhybridtraction,introductiontovarioushybriddrivetrain topologies,powerflowcontrolinhybriddrive-traintopologies,fuelefficiencyanalysis.	08
3	**ElectricDriveTrains:** Electric Drive-trains: Basic concept of electric traction, introduction to various electricdrive-traintopologies,powerflowcontrolinelectricdrive-traintopologies,fuelefficiency analysis. Electric Propulsion unit: Introduction to electric components usedinhybridandelectricvehicles; Configuration and control: BLDC Motor drives, Induction Motor drives, PermanentMagnetMotordrives,Switch ReluctanceMotordrives;drivesystemefficiency.	07

4	**EnergyStorage:** IntroductiontoEnergyStorageRequirementsinHybridandElectricVehicles;Energy storageanditsanalysis:Battery,FuelCell,SuperCapacitorandFlywheel,Hybridizationofdifferent energy storagedevices.	06
5	**EnergyManagementStrategies:** Introduction to energy management strategies used in hybrid and electric vehicles,classificationof different energymanagement strategies,comparison ofdifferentenergymanagementstrategies,implementationissuesofenergymanagementstrategies.	04
6	**DesignofEV/HEV:** Tractive Effort calculation, Sizing the drive system: Sizing the propulsion motor, sizingthepowerelectronics,selectingtheenergystoragetechnology,DesignconsiderationsforaHybridElectricVehicle(HEV),DesignconsiderationsforBatteryElectricVehicle (BEV).	09

TextBooks:

1. C. Mi, M. A. Masrur and D. W. Gao, Hybrid Electric Vehicles: Principles and Applications with PracticalPerspectives, JohnWiley&Sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, Hybrid Electric Vehicles: Energy Management Strategies, Springer,2015.
4. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles:Fundamentals,Theory,andDesign,CRCPress, 2004.
5. T.Denton,—ElectricandHybridVehicles,Routledge,2016

Referencebooks:

1. I.Hussein,ElectricandHybridVehicles:DesignFundamentals,CRCPress,2003.
2. Sheldon Williamsom, Energy Management Strategies for Electric and Plug-in Hybrid Vehicles, Springer2013
3. J.LarminieandJ.Lowry,ElectricVehicleTechnologyExplained,Wiley,2003
4. RobertA.Huggins,EnergyStorage,Springer2010

WebsiteReference:

1.http://nptel.iitm.ac.in:Introductionto HybridandElectricVehicles -Webcourse

Assessment:

InternalAssessmentconsistsof twotestsout ofwhich;one should becompulsoryclass test(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwill compriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(ContactHours)**		**CreditsAssigned**		
PEDPE1021	**Digital SignalController**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDPE1021	**Digital SignalController**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

CourseObjectives	1. Toimpartknowledgeofdigitalsignalcontrollerswithindepthunderstandingofvariouson-chipperipherals 2. Toimpartknowledgeofperipheralinterfaces andprogrammingofDSC
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Illustratethe needforDSCinpowerandcontrolapplications 2. Describe thearchitecturalfeaturesanddetailsofDSC 3. DesigntheDSCanaloginterface for realworldmeasurements 4. Use the DSCdigitalinterfaceforpowerandcontrol applications 5. Compareandrecommendtheuseofon-chipcommunicationforvariousapplications

Module	Details	Hours
1	**Introduction** Reviewofmicroprocessor,microcontrolleranddigitalsignalprocessors(DSP)architecture, Fixed and floating-point processors Number formats and operations: Fixedpoint 16 bit numbers representations of signed integers and fraction, Floating PointNumbers.ReviewofcommonlyusedDSPprocessorsandtheirapplications,introduction toTMS320C2000digitalsignalcontroller(DSC)	06
2	**DSCArchitecture** OverviewofTMS320C2000Digitalsignalcontrollerfamily–Features,Architecture,Interrupt and Reset, Memory map - On-chip memories: Flash, RAM, and Boot ROM,Clocksystem	06
3	**DSCProgramming** Codedevelopmentprocess,Assemblylanguageprogramming,Linker,CCompiler,Code ComposerStudio(CCS)andonline debuggingtools	05
4	**AnalogInterfaceforDSC** AnalogtoDigitalConverter(ADC):operatingprincipalblockdiagram,modesofoperation,configurationofADCsensingvoltage,currentandotheranalogsignal,programmingfor analoginterface.Designaspectsforreal worldmeasurements.	07
5	**DigitalInterfaceforDSC:** Block diagram, operation and configuration details of-Digital I/O -CPU Timers – PulseWidth Modulator (PWM), High Resolution PWM, Capture Module, Quadrature EncoderPulse(QEP);useoftheseperipheralsfor realtimepower andcontrolapplications	08
6	**DSCCommunicationInterfaceandProtocols:** Onchipcommunicationinterface,configurationanduse-ControllerAreaNetwork,SPI/SCI,I2C.Physicallayerinterface,programmingfordatatransfer.	07

ReferenceBooks:

1. DigitalSignalProcessinginPowerElectronicsControlCircuits byKrzysztofSozanski,Springer

2. DigitalSignalProcessinginPowerSystemProtectionandControlbyWaldemarRebizant,JanuszSzafran,and AndrzejWiszniewski,Springer.
3. Digital PowerElectronicsandApplicationsby*FangLinLuo,HongYeandMuhammadRashid,*ElsevierAcademicPres s.
4. DigitalSignalProcessinginPowerElectronicsControlCircuits byKrzysztofSozanski,Springer
5. DSPBasedElectromechanicalMotionControlbyHamidToliyatandStevenCampbell,CRCPress

WebReferences:

1. https://training.ti.com/c2000-f2837xd-microcontroller-one-day-workshop-series
2. https://software-dl.ti.com/trainingTTO/trainingTTO_public_sw/c28x28379/F2837xD_Microcontroller_M
3. https://www.ti.com/microcontrollers-mcus-processors/microcontrollers/c2000-real-time-control-mcus/overview.html
4. TheEssentialGuideforDevelopingwithC2000™RealTimeMicrocontrollers:TexasInstruments

Assessment:

InternalAssessmentconsistsoftwotestsoutofwhich;one shouldbecompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

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4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	CourseName	Teachingscheme(ContactHours)		CreditsAssigned		
PEDPE1021	Microgrid Technology	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDPE1021	Microgrid Technology	20	20	20	80	3	-	-	100

CourseObjectives	1. Tointroducethefundamentalconcept,variouspowerarchitecturesandcontrolofdistributedgenerationandmicrogrids. 2. Toreviewvariousregulatorystandardsandstateofthe artofmicrogrids 3. TounderstandthemicrogridandSmartGriddeploymentsforlargescaleintegrationofcleanenergysources,varioustechnologies,automationandICTinfrastructure requirements.
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Toidentifyanddescribetheimpactofrenewableenergyintegrationformitigatingenergycrisesand sustainable future. 2. Toidentifyanddescribetheconceptof Microgridanditsvarioustopologies,modesofoperationcontrol andcommunicationarchitecture. 3. IllustratevariouscontrolarchitecturesofMicrogrids 4. To identify anddescribetheconceptofSmartGrid, itsfeaturesandthestateof theart. 5. TounderstandvariousSmartGridtechnologies,automation,resiliencyanditsadoptionincurrent powersystem.

Module	Details	Hours
1	**PowerSystemScenario:** Present Energy Scenario, Review of various renewabletechnologies: Impact ofgridintegration of renewable energy resources on existing power system, Energy storagesystemandtheir rolein enhancementof performance.	05
2	**IntroductiontoMicrogrid:** Concept of distributed generation, regulatory standard IEEE 1547, requirement for gridinterconnection, islanding issue; Concept of microgrid, review of sources of microgrids,typicalstructureandconfigurationof amicrogrid, AC andDCmicrogrids.	05
3	**PowerElectronicsinterfacesinMicrogrids:** PEinterfacesinDCandACmicrogrids,modesofoperationandcontrolofmicrogrid:gridconnected and islanded mode, Active and reactive power control, Control architecture:centralizedcontrol,decentralized/distributedcontrol,hierarchicalcontrol,MultiagentSystem (MAS) based control	08
4	**IslandingandprotectionMicrogrids:** protectionissues,faultcurrentsource(FCS),adaptiveprotectionscheme;islanding,anti-islandingschemes,activeandpassive anti-islandingschemes	06
5	**DesignofMicrogrids:** Selection and sizing of sources, PE interface design considerations,System level controlimplementation,EnergyManagement considerations	07

6	**IntroductiontoSmartGrid:** ConceptofSmartGrid,Definitions,NeedofSmartGrid,FunctionsofSmartGrid,Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid,ConceptofResilient &Self-HealingGrid; *Smart Grid Technologies:* Smart Meters, Real Time Prizing, Smart Appliances, AutomaticMeterReading(AMR).; *Communication Technology for Microgrids & Smart Grid:* Review of Home Area Network(HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN), ZigBee, MeshNetwork;Cyber Securityfor SmartGrid.	08

TextBooks:

1. MicrogridsarchitecturesandcontrolEditedbyNikosHatziargyriou,Wiley,IEEEPress,2014
2. A.Keyhani,M.N.Marwali,M.Dai,IntegrationofGreenandRenewableEnergyinElectricPowerSystems,Wiley,2009
3. AntonioCarlosZambronideSouza,MiguelCastilla,MicrogridsDesignandImplementation,Springer2019.

ReferenceBooks:

1. A. Yezdani,andRezaIravani,Voltage*Source Convertersin Power Systems: Modeling,ControlandApplications*,JohnWileyPublications,2010
2. DorinNeacsu,*PowerSwitchingConverters:Medium andHighPower*,CRCPress,2006
3. B.M.BuchholzandZ.Styczynski,*SmartGrids–FundamentalsandTechnologiesinElectricityNetworks,* Springer,2014
4. C.W.Gellings,*TheSmartGrid:EnablingEnergyEfficiencyandDemandResponse*,CRCPress,2009
5. J.Ekanayake,N.Jenkins,K.Liyanage,J.Wu,A.Yokoyama,*SmartGrid:TechnologyandApplications*,Wiley,2012
6. J.C.Sabonnadière andN.Hadjsaïd,*SmartGrids*,JohnWiley& SonsandISTE,2012
7. IEEEstandards—IEEE-1547-2003:IEEEStandardforInterconnectingDistributedResourceswithElectricPower SystemsIEEE standards2003
8. IEEEstandards—IEEE1547-4-2011:IEEEGuideforDesignOperation&IntegrationofDistributedResourcesIslandSystemwith ElectricPower System,
9. ConsortiumforElectricReliabilityTechnologySolutions(CERTS)whitepaperonIntegrationofDistributedEnergyResources: The CERTSMicrogridConcept‘2002

Assessment:

InternalAssessmentconsistsoftwotestsoutofwhich;one shouldbecompulsoryclass test(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDPE1021	IoT ApplicationsinElectrical Engineering	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDPE1021	IoT ApplicationsinElectrical Engineering	20	20	20	80	3	-	-	100

CourseObjectives	1. To learntheconceptsofIOT. 2. ToidentifythedifferentIoTtechnology. 3. Tolearndifferentprotocolsusedin IOT. 4. Tolearnhowto analysethe datainIOT. 5. Tolearndifferentapplicationsin IOT
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Apply theconceptsofIOT. 2. Identifythe differenttechnology. 3. Analysisandevaluateprotocolsusedin IOT 4. Analysisandevaluate thedata receivedthroughsensorsinIOT. 5. Apply IOTto differentapplications.

Module	Details	Hours
1	**IntroductiontoInternetofThings**: DefinitionandcharacteristicsofIoT,PhysicaldesignofIoT-ThingsinIoT,IoTprotocol,LogicaldesignofIoT–IoTfunctionalblocks,IoTCommunicationModels,IoT communicationAPIs.	04
2	**VariousTechnologiesforImplementationsofIOT:** DefiningSpecificationsAbout-Purpose&requirements,process,domainmodel,information model, service, IoT level, Functional view, Operational view, Device andComponentIntegration, ApplicationDevelopment, Case Study	06
3	**CommunicationTechnologies:** IntroductiontoCommunicationTechnologies802.15.4,ZigBee,BLE,WiFi,LORA,GSMbasicprotocol,topologies,datarate, range, power,computations/bandwidth,QoS	06
4	**CommunicationModelandProtocols:** CommunicationModelandProtocolsM2MvsIOT,ResourceManagement,Registration,Discovery Data Exchange Formats – XML & JSON, MQTT Protocol, RESTFul Architecture,HTTPRESTModel ,CoAPProtocol.	08
5	**RFIDTechnology:** Introduction,principleofRFID,componentsofRFIDsystem:RFIDtag,Reader,RFIDmiddleware, issues,RFID, transponder,RFIDarchitecture,	09
6	**IOTApplication**: CaseStudiesofIOTHome(SmartLightingandIntrusiondetection),Cities(SmartParking,Garbagecollection),Environment(Pollutiondetection,ForestFireDetection),Power (SmartGrid), Retail(InventoryManagement),Health(Monitoringanddetection)	06

TextBooks:

1. FrancisDaCosta,RethinkingtheInternetofThings:AScalableApproachtoConnectingEverything,1stEdition, ApressPublications, 2013
2. WimerHazenberg,MennoHuismanandSaraCordobaRubino,MetaProducts:BuildingtheInternetofThings, BIS publishers.
3. InternetofThingsconnectingobjectstothe web,byHakimaChaouchi,Wiley.
4. InternetofThings(AHands-on-Approach)byArshdeepBhagaandVijayMadisetti.

ReferenceBooks:

1. TheInternetofThings(MITPress)bySamuelGreengard.
2. TheInternetofThings(Connectingobjectsto theweb)byHakimaChaouchi(WileyPublications).
3. RFID andtheInternetof Things,by Hervechabanne,Wiley

Assessment:
InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwill compriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
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M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(ContactHours)**		**CreditsAssigned**		
PEDL101	**Drives andControl Lab**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		--	**2**	**--**	**1**	**1**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDL101	**Drivesand ControlLab**	--	--	--	--	--	**25**	**25**	**50**

CourseObjectives	To impartknowledgeonelectricaldrivesandcontrol
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Simulate drivesandcontrolapplications. 2. Analyzethesimulationresults. 3. Identifythe implementationmethodsofdrives 4. InterfacePLCwithDrivesforAutomation

Listofsuggestedexperiments:

1. DeveloptheмodelofDCMotorandanalyzethe performance(Simulation)
2. DeveloptheмodelofthreephaseInductionMotorandanalyze theperformance (Simulation)
3. SimulationofHalfControlledandFully ControlledConverterfedDCDrives.
4. FourQuadrantChopperfedDCMotor.
5. Simulation of PWM Inverter fed Three Phase Induction Motor Control: Compare stator voltage controlandV/f control for a constant torqueload.
6. OpenloopV/f controlof ThreePhaseInductionMotor.
7. ClosedloopV/fcontrolofThreePhaseInductionMotor.
8. VectorControlofThreePhase InductionMotor.
9. Simulationof Sensorless ControlofThreePhaseInductionMotor.
10. SpeedControlofBLDCMotor.
11. SpeedControlofPermanentMagnetSynchronousMotor.
12. ElectricalBrakingofAC/DCMotor.
13. PLCwithACDriveforAutomation -Controlusingdigital/ analog/ FieldbusCommunication
14. PLCwithACServoDriveforPositionControl.

ReferenceBooks:-

1. AnalysisofElectricMachineryP.C.Krause,McGraw Hill,NewYork
2. PowerSemiconductor ControlledDrives, G.K.Dubey,Prentice-HallInternational.
3. D. W. Novotny and T. A. Lipo, Vector Control and Dynamics of AC Drives, Oxford University Press,1996.
4. PowerElectronicsbyMuhammadH.Rashid,Pearson
5. ControlofElectricaldrives,W.Leonhard,Springer-Verlag.
6. JohnChiasson,ModellingandHighPerformance ControlofElectricMachines, Wiley-IEEEPress,2005.
7. I.Boldea,S.A.Nasar, Vector ControlofACDrives, CRC Press,1992.

Termwork:

Term work shall consist of **minimum eight**

experiments.ExperimentsPerformance :

10marks

Journal :10marks

Attendance :05marks

Thefinalcertificationandacceptanceoftermworkensures theminimum passingintheterm work.

OralExamination:

Oralexaminationwillbebased onentirelabwork

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(ContactHours)**		**CreditsAssigned**		
PEDSBL101	**Power ElectronicsDesignLab-I**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		--	**4$**	**--**	**2**	**2**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDSBL101	**PowerElectronics DesignLab-I**	--	--	--	--	--	**50**	**50**	**100**

CourseObjectives	To impartknowledgeon 1. Variousauxiliarycircuits requiredforpowerelectronicconverters 2. Hardware implementationaspectsofconverters
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Designandimplementauxiliarycircuitsofpowerelectronicconverters 2. Designandimplementpowerelectronicconverters 3. Use controllersforpowerconvertercontrol

Listofsuggestedexperiments:

1. DesignofGate drivercircuitsforSidevices likePowerMOSFETSorIGBTsanditsPCB fabrication.
2. DesignofGate drivercircuits forWidebandgapdevices likeSiCorGaNanditsPCBfabrication.
3. DesignandImplementationofSnubbercircuitandHeatsink
4. DesignofPWMControllerICbasedClosedloopcontrolledDC-DCConverter
5. Design/Codingofmicrocontrollerbasedvoltage controlofDC-DCConverterandits implementation
6. Design/Codingofmicrocontrollerbasedvoltagecontrolof Inverteranditsimplementation

AnyotherdesignexercisebasedonPowerconvertersspecifictoapplicationsinvariousdomainsandtheirimplementation.

References:

1. MohanNed*etal.*,"PowerElectronicsConverters,ApplicationsandDesign",WileyIndiaPvt.Ltd.,NewDelhi.
2. L.Umanand,Bhatt,"DesignofMagneticComponentsforSwitchedModePowerConverters",JohnWiley&Sons
3. NPTELcourseon"Designof PowerElectronic Converters",Prof. ShabariNath,IITGuwahati.
4. NPTELcourseon"AdvancedPowerElectronics andControl", Prof.AvikBhattacharya,IITRoorkee.

Termwork:

Term work shall consist of **minimum three experiments**.ExperimentsPerformance :10marks
Attendance : 05marks
Journal : 10marks

Thefinalcertificationandacceptance oftermworkensures theminimum passinginthe term work.

OralExamination:

Oralexaminationwill bebased onentirelabwork

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(Contact Hours)**		**CreditsAssigned**		
PEDIE1011	**Product Life CycleManagement**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1011	**ProductLifeCycle Management**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1.To familiarize the students with the need, benefits and components of PLM2.Toacquaint students withProductDataManagement& PLMstrategies 3. Togiveinsightsintonewproductdevelopmentprogramandguidelinesfordesigninganddevelopinga product 4. TofamiliarizethestudentswithVirtualProductDevelopment
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. GainknowledgeaboutphasesofPLM,PLMstrategiesandmethodologyforPLMfeasibilitystudy andPDMimplementation. 2. Illustratevariousapproachesandtechniquesfordesigninganddevelopingproducts. 3. Applyproductengineeringguidelines/thumbrulesindesigningproductsformoulding,machining, sheet metalworking etc. 4. Acquireknowledgeinapplyingvirtualproductdevelopmenttoolsforcomponents,machiningandmanufacturing plant

Module	Contents	Hours
1	**IntroductiontoProductLifecycleManagement(PLM):** Product LifecycleManagement(PLM),NeedforPLM,ProductLifecyclePhases,OpportunitiesofGlobalization,Pre-PLMEnvironment,PLMParadigm,Importance&Benefitsof PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLMInitiative,PLMApplications **PLM Strategies:** Industrial strategies, Strategy elements, its identification, selection andimplementation,DevelopingPLMVisionandPLMStrategy,ChangemanagementforPLM	10
2	**ProductDesign:** ProductDesignandDevelopmentProcess,EngineeringDesign,OrganizationandDecomposition in Product Design, Typologies of Design Process Models, Reference Model,Product Design in the Context of the Product Development Process, Relation with theDevelopmentProcessPlanningPhase,RelationwiththePostdesignPlanningPhase,MethodologicalEvolutioninProductDesign,ConcurrentEngineering,CharacteristicFeatures of Concurrent Engineering, Concurrent Engineering and Life Cycle Approach, NewProductDevelopment(NPD)andStrategies,ProductConfigurationandVariantManagement,The DesignforXSystem,Objective PropertiesandDesignforXTools,Choice ofDesignforXToolsand Their UseintheDesignProcess	09

3	**ProductDataManagement(PDM):** ProductandProductData,PDMsystemsandimportance,ComponentsofPDM,Reasonfor implementingaPDMsystem,financialjustificationofPDM,barrierstoPDMimplementation	05
4	**VirtualProductDevelopmentTools:** Forcomponents,machines,andmanufacturingplants,3DCADsystemsandrealistic renderingtechniques,Digitalmock-up,Modelbuilding,Modelanalysis,ModelingandsimulationsinProduct Design, Examples/Casestudies	05
5	**IntegrationofEnvironmentalAspectsinProductDesign:** SustainableDevelopment,DesignforEnvironment,NeedforLifeCycleEnvironmentalStrategies, UsefulLifeExtensionStrategies,End-of-LifeStrategies,IntroductionofEnvironmentalStrategiesintotheDesignProcess,LifeCycleEnvironmentalStrategiesand ConsiderationsforProductDesign	05
6	**LifeCycleAssessmentandLifeCycleCostAnalysis:** Properties, and Framework of Life Cycle Assessment, Phases of LCA in ISO Standards, Fieldsof Application and Limitations of Life Cycle Assessment, Cost Analysis and the Life CycleApproach,GeneralFrameworkforLCCA,EvolutionofModelsforProductLifeCycleCost Analysis	05

References:

1. JohnStark,"ProductLifecycleManagement:Paradigmfor21stCenturyProductRealisation",Springer-Verlag,2004.ISBN: 1852338105
2. FabioGiudice,GuidoLaRosa,AntoninoRisitano,"ProductDesignfortheenvironment-Alifecycleapproach",Taylor&Francis 2006, ISBN:0849327229
3. SaaksvuoriAntti,ImmonenAnselmie,"ProductLifeCycleManagement",Springer,Dreamtech,ISBN:3 540257314
4. Michael Grieve, "Product Lifecycle Management: Driving the next generation of lean thinking", TataMcGraw Hill,2006,ISBN:0070636265

Assessment:

InternalAssessmentfor20marks: Consisting**TwoCompulsoryClassTests**

First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3thenpart (b)will befromanymoduleotherthanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE1012	**Reliability Engineering**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1012	**Reliability Engineering**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. To familiarizethe studentswithvariousaspectsofprobability theory 2. To acquaintthestudentswithreliabilityanditsconcepts 3. Tointroducethestudentstomethodsofestimatingthesystemreliabilityofsimpleandcomplexsystems 4. To understandthevariousaspectsofMaintainability,AvailabilityandFMEAprocedure
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. Understandandapplytheconceptof Probabilitytoengineeringproblems 2. Applyvariousreliabilityconceptstocalculatedifferentreliabilityparameters 3. Estimatethesystemreliabilityofsimpleandcomplexsystems 4. CarryoutaFailureModeEffectandCriticalityAnalysis

Module	**DetailedContents**	**Hours**
1	**Probabilitytheory:**Probability:Standarddefinitionsandconcepts;ConditionalProbability,Baye's Theorem. **ProbabilityDistributions:**CentraltendencyandDispersion;Binomial,Normal,Poisson,Weibull,Exponential,relations between themandtheir significance. **MeasuresofDispersion:**Mean,Median,Mode,Range,MeanDeviation,Standard Deviation,Variance,SkewnessandKurtosis.	08
2	**ReliabilityConcepts:**Reliabilitydefinitions,ImportanceofReliability,QualityAssuranceandReliability,BathTubCurve. **FailureDataAnalysis:**Hazardrate,failuredensity,FailureRate,MeanTimeToFailure(MTTF),MTBF,ReliabilityFunctions. **ReliabilityHazardModels:**ConstantFailureRate,Linearlyincreasing,TimeDependent FailureRate,WeibullModel.Distributionfunctionsandreliabilityanalysis.	08
3	**SystemReliability:** SystemConfigurations:Series,parallel,mixedconfiguration,koutofnstructure,Complex systems.	05
4	**ReliabilityImprovement:** RedundancyTechniques:Elementredundancy,Unitredundancy,Standbyredundancies.Markovanalysis. SystemReliabilityAnalysis–Enumerationmethod,Cut-setmethod,SuccessPathmethod, Decompositionmethod.	08

5	**MaintainabilityandAvailability:** System downtime, Design for Maintainability: Maintenance requirements, Designmethods: Fault Isolation and self-diagnostics, Parts standardization andInterchangeability,ModularizationandAccessibility, RepairVs Replacement. Availability– qualitativeaspects.	05
6	**FailureMode,EffectsandCriticalityAnalysis:** Failure mode effects analysis, severity/criticality analysis, FMECA examples. Fault treeconstruction,basicsymbols,developmentoffunctionalreliabilityblockdiagram,Fau1t treeanalysisandEventtree Analysis	05

References:

1. L.S.Srinath,"ReliabilityEngineering",AffiliatedEast-WastPress(P)Ltd.,1985.
2. CharlesE.Ebeling,"ReliabilityandMaintainabilityEngineering",TataMcGrawHill.
3. B.S.Dhillion,C.Singh,"EngineeringReliability",JohnWiley& Sons,1980.
4. P.D.T.Conor,"PracticalReliability Engg.",JohnWiley&Sons,1985.
5. K.C.Kapur,L.R.Lamberson,"Reliability inEngineeringDesign", JohnWiley& Sons.
6. MurrayR.Spiegel,"ProbabilityandStatistics",TataMcGraw-HillPublishingCo.Ltd

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelectureh oursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3thenpart (b)will befromanymoduleotherthanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(Contact Hours)**		**CreditsAssigned**		
PEDIE1013	**ManagementInformationSystem**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1013	**Management InformationSystem**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. ThecourseisblendofManagementandTechnicalfield. 2. Discusstherolesplayedbyinformationtechnologyintoday'sbusinessanddefinevarioustechnology architecturesonwhichinformationsystems arebuilt 3. Defineandanalyzetypicalfunctionalinformationsystemsandidentifyhowtheymeettheneedsofthe firmtodeliverefficiency andcompetitiveadvantage 4. Identifythe basicstepsinsystemsdevelopment
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. ExplainhowinformationsystemsTransformBusiness 2. Identifytheimpactinformationsystemshaveonanorganization 3. Describe IT infrastructureanditscomponentsanditscurrenttrends 4. Understandtheprincipaltoolsandtechnologiesforaccessinginformationfromdatabasestoimprove businessperformanceanddecisionmaking 5. Identifythetypesofsystemsusedforenterprise-wideknowledgemanagementandhowtheyprovidevalueforbusinesses

Module	Contents	Hours
1	**IntroductionToInformationSystems(IS):** ComputerBasedInformationSystems,ImpactofITonorganizations,ImportanceofIStoSociety. Organizational Strategy,CompetitiveAdvantages andIS	04
2	**DataandKnowledgeManagement:**DatabaseApproach,BigData,DatawarehouseandDataMarts, KnowledgeManagement **Businessintelligence(BI):**ManagersandDecisionMaking,BIforDataanalysisand PresentingResults	07
3	**EthicalissuesandPrivacy:** InformationSecurity.ThreattoIS,andSecurityControls	07
4	**SocialComputing(SC):** Web2.0and3.0,SCinbusiness-shopping,Marketing,OperationalandAnalyticCRM,E-business andE-commerce–B2BB2C.Mobilecommerce.	07
5	**ComputerNetworks**WiredandWirelesstechnology,Pervasivecomputing,Cloud computingmodel.	06
6	**InformationSystemwithinOrganization:** TransactionProcessingSystems,FunctionalAreaInformationSystem,ERPandERPsupportof BusinessProcess. AcquiringInformationSystemsandApplications:VariousSystemdevelopmentlifecycle models.	08

References:

1. KellyRainer,BradPrince,ManagementInformationSystems,Wiley
2. K.C.LaudonandJ.P.Laudon,ManagementInformationSystems:ManagingtheDigitalFirm,10th Ed.,Prentice Hall,2007.
3. D.Boddy,A.Boonstra,ManagingInformationSystems:StrategyandOrganization,PrenticeHall,2008

Assessment:

InternalAssessmentfor20marks:

Consisting**TwoCompulsoryClassTests**

First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcompriseoftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3thenpart (b)will befromanymoduleotherthanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE1014	**Design ofExperiments**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1014	**Designof Experiments**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. TounderstandtheissuesandprinciplesofDesignofExperiments(DOE) 2. Tolisttheguidelines fordesigningexperiments 3. Tobecomefamiliarwithmethodologiesthatcanbeusedinconjunctionwithexperimentaldesigns for robustness andoptimization
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. Plandatacollection,toturndataintoinformationandtomakedecisionsthatleadtoappropriateaction 2. Apply themethodstaughtto real lifesituations 3. Plan,analyze, andinterpretthe resultsofexperiments

Module	**Contents**	**Hours**
1	**Introduction** 1.1 StrategyofExperimentation 1.2 TypicalApplicationsofExperimentalDesign 1.3 GuidelinesforDesigningExperiments 1.4 ResponseSurfaceMethodology	06
2	**FittingRegressionModels** 2.1 Linear RegressionModels 2.2 EstimationoftheParametersinLinearRegressionModels 2.3 HypothesisTestinginMultipleRegression 2.4 ConfidenceIntervalsinMultipleRegression 2.5 Predictionofnewresponseobservation 2.6 Regressionmodeldiagnostics 2.7 Testingforlackoffit	08
3	**Two-LevelFactorialDesigns** 3.1 The2^2 Design 3.2 The2^3Design 3.3 The General2^kDesign 3.4 A SingleReplicateof the2^kDesign 3.5 TheAdditionofCenterPointstothe 2^kDesign, 3.6 Blockinginthe2^kFactorial Design 3.7 Split-PlotDesigns	07

4	**Two-LevelFractionalFactorialDesigns** 4.1 TheOne-HalfFractionofthe2^kDesign 4.2 TheOne-QuarterFractionofthe2^kDesign 4.3 The General2^{k-p}FractionalFactorialDesign 4.4 ResolutionIIIDesigns 4.5 ResolutionIVandV Designs 4.6 FractionalFactorialSplit-PlotDesigns	07
5	**ResponseSurfaceMethodsandDesigns** 5.1 IntroductiontoResponseSurfaceMethodology 5.2 TheMethodof SteepestAscent 5.3 AnalysisofaSecond-OrderResponse Surface 5.4 ExperimentalDesignsforFittingResponseSurfaces	07
6	**TaguchiApproach** 6.1 CrossedArrayDesignsandSignal-to-NoiseRatios 6.2 AnalysisMethods 6.3 Robustdesignexamples	04

References:

1. Raymond H. Mayers, Douglas C. Montgomery, Christine M. Anderson-Cook, Response SurfaceMethodology: Process and Product Optimization using DesignedExperiment, 3rd edition, JohnWiley&Sons, NewYork, 2001
2. D.C. Montgomery, Design and Analysis of Experiments, 5th edition, John Wiley & Sons, NewYork,2001
3. GeorgeEPBox,JStuartHunter,WilliamGHunter,StaticsforExperimenters:Design,InnovationandDiscovery,2ndEd.Wiley
4. WJDimond,PracticalExperimentDesignsforEngineersandScientists,JohnWileyandSonsInc.ISBN:0-471-39054-2
5. DesignandAnalysisofExperiments(SpringertextinStatistics),SpringerbyA.M.Dean,andD.T.Voss

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelectureh oursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3thenpart (b)will befromanymoduleotherthanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDIE1015	Operations Research	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE1015	Operations Research	20	20	20	80	3	--	--	100

CourseObjectives	1. Formulateareal-worldproblem asamathematicalprogrammingmodel. 2. Understandthemathematicaltoolsthatareneededto solveoptimizationproblems. 3. Usemathematicalsoftwareto solvetheproposedmodels.
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. Understand the theoretical workings of the simplex method, the relationship between a linearprogramanditsdual, includingstrongdualityandcomplementary slackness. 2. Perform sensitivity analysis to determine the direction and magnitude of change of a model'soptimalsolutionasthedata change. 3. Solvespecializedlinearprogrammingproblemslikethetransportationandassignmentproblems,solvenetworkmodelsliketheshortestpath,minimumspanningtree,andmaximumflow problems. 4. Understandtheapplicationsofintegerprogrammingandaqueuingmodelandcompute importantperformancemeasures

Module	Contents	Hours
1	**IntroductiontoOperationsResearch**:Introduction,StructureoftheMathematicalModel,LimitationsofOperations Research **LinearProgramming**:Introduction,LinearProgrammingProblem,RequirementsofLPP,MathematicalFormulationofLPP,Graphicalmethod,SimplexMethodPenaltyCostMethodorBig M-method,TwoPhase Method,Revisedsimplexmethod,**Duality**,Primal–Dualconstruction,SymmetricandAsymmetricDual,WeakDualityTheorem,Complimentary SlacknessTheorem,MainDualityTheorem,DualSimplexMethod,SensitivityAnalysis **TransportationProblem**:Formulation,solution,unbalancedTransportationproblem.Findingbasicfeasiblesolutions–Northwestcornerrule,leastcostmethodandVogel'sapproximation method. Optimality test: the stepping stone method and MODI method.**AssignmentProblem**:Introduction,MathematicalFormulationoftheProblem,Hungarian Method Algorithm, Processing of n Jobs Through Two Machines and mMachines,GraphicalMethodofTwoJobsmMachinesProblemRoutingProblem,TravellingSalesmanProblem **IntegerProgrammingProblem**:Introduction,TypesofIntegerProgrammingProblems, Gomory'scuttingplaneAlgorithm,BranchandBoundTechnique.IntroductiontoDecompositionalgorithms.	14

2	**Queuingmodels**:queuingsystemsandstructures,singleserverandmulti-servermodels,Poissoninput,exponentialservice,constantrate service,finiteandinfinitepopulation	05
3	**Simulation**: Introduction, Methodology of Simulation, Basic Concepts, SimulationProcedure, Application of Simulation Monte-Carlo Method:Introduction, Monte-CarloSimulation,ApplicationsofSimulation,AdvantagesofSimulation,Limitationsof Simulation	05
4	**Dynamicprogramming**.Characteristicsofdynamicprogramming.Dynamicprogramming approach for Priority Management employment smoothening, capitalbudgeting,StageCoach/ShortestPath,cargo loadingandReliabilityproblems.	05
5	**Game Theory**. Competitive games, rectangular game, saddle point, minimax (maximin)method of optimal strategies, value of the game. Solution of games with saddle points,dominance principle. Rectangular games without saddle point – mixed strategy for 2 X2 games.	05
6	**InventoryModels**:ClassicalEOQModels,EOQModelwithPriceBreaks,EOQwithShortage,ProbabilisticEOQModel	05

REFERENCES:

1. Taha,H.A."OperationsResearch -AnIntroduction",PrenticeHall,(7thEdition),2002.
2. Ravindran,A,Phillips,D.TandSolberg,J.J."OperationsResearch:PrinciplesandPractice",JohnWilley andSons,2ndEdition, 2009
3. Hiller,F.S.andLiebermann,G.J."IntroductiontoOperationsResearch",TataMcGrawHill,2002.
4. OperationsResearch,S.D.Sharma,KedarNathRam Nath-Meerut
5. OperationsResearch,KantiSwarup,P.K.GuptaandManMohan,SultanChand&Sons

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcompriseoftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part (b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE1016	**Cyber Security andLaws**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1016	**CyberSecurityand Laws**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. To understandandidentifydifferenttypescybercrimeandcyberlaw 2. To recognizedIndianIT Act2008anditslatestamendments 3. To learnvarioustypesofsecurity standardscompliances
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. Understandtheconceptofcybercrimeand itseffectonoutsideworld 2. Interpret andapplyITlaw invariouslegalissues 3. Distinguishdifferentaspects ofcyberlaw 4. ApplyInformationSecurityStandardscomplianceduringsoftwaredesignanddevelopment

Module	Contents	Hours
1	**IntroductiontoCybercrime:** Cybercrimedefinitionandoriginsoftheworld,Cybercrimeandinformationsecurity, Classificationsofcybercrime,CybercrimeandtheIndianITA2000,AglobalPerspectiveoncyber crimes.	4
2	**Cyberoffenses&Cybercrime:** How criminal plan the attacks, Social Engg, Cyber stalking, Cyber café and Cybercrimes,Botnets, Attack vector, Cloud computing, Proliferation of Mobile and Wireless Devices,Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, SecurityChallengesPosedbyMobileDevices,RegistrySettingsforMobileDevices,AuthenticationService Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security ImplicationsforOrganizations,OrganizationalMeasuresforHandlingMobile,Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era,Laptops	9
3	**ToolsandMethodsUsedinCyberline:** Phishing,PasswordCracking,KeyloggersandSpywares,VirusandWorms,Steganography,DoS andDDoSAttacks,SQLInjection,BufferOverFlow,Attackson WirelessNetworks,Phishing, IdentityTheft(IDTheft)	6
4	**TheConceptofCyberspace**: E-Commerce, The Contract Aspects in Cyber Law ,The Security Aspect of Cyber Law, TheIntellectual Property Aspect in Cyber Law, The Evidence Aspect in Cyber Law ,TheCriminalAspect in Cyber Law,Global Trends in Cyber Law, LegalFramework forElectronic DataInterchangeLawRelatingtoElectronicBanking,TheNeedforanIndian CyberLaw	8

5	**IndianIT Act:** CyberCrimeandCriminalJustice:Penalties,AdjudicationandAppealsUndertheITAct, 2000,IT Act.2008anditsAmendments	6
6	**InformationSecurityStandardcompliances** SOX,GLBA,HIPAA,ISO,FISMA,NERC,PCI.	6

References:

1. NinaGodbole,SunitBelapure,*Cyber Security*,WileyIndia,NewDelhi
2. TheIndianCyberLaw bySureshT.Vishwanathan;BharatLaw HouseNewDelhi
3. TheInformationTechnologyAct,2000;BareAct-ProfessionalBookPublishers,NewDelhi.
4. CyberLaw&Cyber Crimesby AdvocatePrashantMali;SnowWhitePublications,Mumbai
5. NinaGodbole, *InformationSystemsSecurity,*WileyIndia,NewDelhi
6. KennetchJ.Knapp,*CyberSecurity*&*GlobalInformationAssurance*InformationSciencePublishing.
7. WilliamStallings*,CryptographyandNetworkSecurity,*PearsonPublication
8. Websitesformoreinformationisavailableon:TheInformationTechnologyACT,2008-TIFR:https://www.tifrh.res.in
9. Website for more information: A Compliance Primer for IT professional:https://www.sans.org/reading-room/whitepapers/compliance/compliance- primerprofessionals-33538

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part (b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(ContactHours)**		**CreditsAssigned**		
PEDIE1017	**DisasterManagement and MitigationMeasures**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Course code	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1017	**Disaster ManagementandMitigation Measures**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. To understandphysicsandvarioustypesof disasteroccurringaroundtheworld 2. To identifyextentanddamagingcapacityofadisaster 3. To studyandunderstandthe meansoflossesandmethodstoovercome/minimize it. 4. To understandroleof individualandvariousorganizationduringandafter disaster 5. To understandapplicationofGISinthefieldofdisastermanagement 6. Tounderstandtheemergencygovernmentresponsestructuresbefore,duringandafterdisaster
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Gettoknownaturalaswellasmanmadedisasterandtheirextentandpossibleeffectsontheeconomy. 2 Planofnationalimportancestructuresbaseduponthepreviushistory. 3 Getacquaintedwithgovernmentpolicies,actsandvariousorganizationalstructureassociatedwith anemergency. 4 Gettoknow thesimpledo's anddon'tsinsuch extreme eventsandactaccordingly.

Module	Contents	Hours
1	**Introduction** 1.1DefinitionofDisaster,hazard,globalandIndianscenario,generalperspective,importance of study in human life, Direct and indirect effects of disasters, long termeffectsofdisasters. Introductiontoglobalwarmingandclimatechange.	03
2	**NaturalDisasterandManmadedisasters:** 2.1 Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought,cloudburst,Earthquake,Landslides,Avalanches,Volcaniceruptions,Mudflow,Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozonedepletion 2.2 Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growingpopulationandsubsequentindustrialization,urbanizationandchanginglifestyleof humanbeingsinfrequentoccurrencesofmanmadedisasters.	09
3	**DisasterManagement,PolicyandAdministration** 3.1 Disastermanagement:meaning,concept,importance,objectiveofdisastermanagement policy,disasterrisksinIndia,Paradigm shiftindisastermanagement. 3.2 Policy and administration: Importance and principles of disaster management policies,command and coordination of in disaster management, rescue operations-how to startwithandhowtoproceedinduecourseoftime,studyofflowchartshowingtheentire process.	06

4	**InstitutionalFrameworkforDisasterManagementinIndia:** 4.1 Importanceofpublicawareness,Preparationandexecutionofemergencymanagement program. Scope and responsibilities of National Institute of DisasterManagement (NIDM) and National disaster management authority (NDMA) in India.Methodsandmeasurestoavoiddisasters,Managementofcasualties,setupofemergencyfacilities,importanceofeffectivecommunicationamongstdifferentagenciesin suchsituations. 4.2 UseofInternetandsoftwaresforeffectivedisastermanagement.ApplicationsofGIS, Remotesensing andGPSinthis regard.	06
5	**FinancingReliefMeasures:** 5.1 Waystoraisefinanceforreliefexpenditure,roleofgovernmentagenciesandNGO'sinthis process, Legal aspects related to finance raising as well as overall management ofdisasters. Various NGO's and the works they have carried out in the past on theoccurrenceofvariousdisasters,Waystoapproach theseteams. 5.2 Internationalreliefaidagencies andtheir role inextremeevents.	09
6	**PreventiveandMitigationMeasures:** 6.1 Pre-disaster,duringdisasterandpost-disastermeasuresinsomeeventsingeneral 6.2 Structuralmapping:Riskmapping,assessmentandanalysis,seawallsandembankments, Bioshield,shelters,earlywarningandcommunication 6.3 Non Structural Mitigation: Community based disaster preparedness, risk transfer andriskfinancing,capacitydevelopmentandtraining,awarenessandeducation,contingencyplans. 6.4 Do'sanddon'ts incaseofdisastersandeffective implementationofreliefaids.	06

References:

1. 'DisasterManagement'byHarshK.Gupta,UniversitiesPressPublications.
2. 'DisasterManagement:AnAppraisalofInstitutionalMechanismsinIndia'byO.S.Dagur,publishedby Centrefor landwarfarestudies,NewDelhi, 2011.
3. 'IntroductiontoInternationalDisasterManagement'byDamonCopolla,ButterworthHeinemannElsevierPublications.
4. 'DisasterManagementHandbook'byJackPinkowski,CRCPressTaylorandFrancisgroup.
5. 'Disastermanagement& rehabilitation'byRajdeepDasgupta,MittalPublications,NewDelhi.
6. 'Natural Hazards and Disaster Management, Vulnerability and Mitigation – R B Singh, RawatPublications
7. Concepts and Techniques of GIS –C.P.Lo Albert, K.W. Yonng – Prentice Hall (India) Publications.(LearnersareexpectedtoreferreportspublishedatnationalandInternationallevelandupdatedinformationavailableonauthentic web sites)

Assessment:

InternalAssessmentfor20marks: Consisting**TwoCompulsoryClassTests**

First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightage of each module in end semester examination will be proportional to number of respectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3 then,part (b)will befromanymoduleotherthanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE1018	**Energy Audit andManagement**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1018	**EnergyAuditand Management**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. Tounderstandtheimportanceenergysecurityforsustainabledevelopmentandthefundamentalsofenergyconservation. 2. Tointroduceperformanceevaluationcriteriaofvariouselectricalandthermalinstallationsto facilitatethe energymanagement 3. To relate the data collected during performance evaluation of systems for identificationofenergy savingopportunities.
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. To identifyanddescribe presentstate ofenergysecurityanditsimportance. 2. Toidentifyanddescribethebasicprinciplesandmethodologiesadoptedinenergyauditofautility. 3. To describe the energy performance evaluation of some common electrical installations andidentify theenergy savingopportunities. 4. Todescribetheenergyperformanceevaluationofsomecommonthermalinstallationsandidentify theenergy savingopportunities 5. To analyze the data collected during performance evaluation and recommend energy savingmeasures

Module	Contents	Hours
1	**EnergyScenario:** PresentEnergyScenario,EnergyPricing,EnergySectorReforms,EnergySecurity,EnergyConservationanditsImportance,EnergyConservationAct-2001anditsFeatures.Basicsof Energyanditsvariousforms,MaterialandEnergybalance	04
2	**EnergyAuditPrinciples:** Definition,Energyaudit-need,Typesofenergyaudit,Energymanagement(audit)approach-understanding energy costs, Bench marking, Energy performance, Matchingenergy use to requirement, Maximizing system efficiencies, Optimizing the input energyrequirements, Fuel and energy substitution. Elements of monitoring& targeting; EnergyauditInstruments;Data andinformation-analysis. Financialanalysistechniques:Simplepaybackperiod,NPV,Returnoninvestment(ROI), Internal rateofreturn(IRR)	08
3	**EnergyManagementandEnergyConservationinElectricalSystem:** Electricitybilling,Electricalloadmanagementandmaximumdemand Control;Powerfactorimprovement,Energyefficient equipmentsandappliances,starratings. **Energyefficiencymeasuresinlightingsystem,lightingcontrol:**Occupancysensors,daylight integration, anduseofintelligentcontrollers.	10

	Energyconservationopportunitiesin:waterpumps,industrialdrives,inductionmotors,motorretrofitting, soft starters,variablespeeddrives.	
4	**EnergyManagementandEnergyConservationinThermalSystems:** Reviewofdifferentthermalloads;Energyconservationopportunitiesin:Steamdistributionsystem,Assessment ofsteamdistributionlosses,Steamleakages,Steamtrapping,Condensateandflashsteamrecoverysystem. General fuel economy measures in Boilers and furnaces, Waste heat recovery, use ofinsulation- types and application. HVAC system: Coefficient of performance, Capacity,factorsaffectingRefrigerationandAirConditioningsystemperformanceandsavings opportunities.	10
5	**EnergyPerformanceAssessment:** On site Performance evaluation techniques, Case studies based on: Motors and variablespeeddrive,pumps,HVACsystemcalculations;LightingSystem:InstalledLoadEfficacy Ratio(ILER)method,FinancialAnalysis.	04
6	**EnergyconservationinBuildings:** Energy Conservation Building Codes (ECBC): Green Building, LEED rating, Application ofNon-ConventionalandRenewableEnergySources	03

References:

1. HandbookofElectricalInstallationPractice,GeofryStokes,BlackwellScience
2. Designingwithlight:LightingHandbook,By AnilValia,LightingSystem
3. EnergyManagementHandbook,ByW.C.Turner,JohnWileyandSons
4. HandbookonEnergyAuditsandManagement,editedbyA.K.Tyagi,TataEnergyResearchInstitute(TERI).
5. EnergyManagementPrinciples,C.B.Smith,PergamonPress
6. EnergyConservationGuidebook,DaleR.Patrick,S.Fardo,RayE.Richardson,FairmontPress
7. HandbookofEnergyAudits,AlbertThumann,W.J.Younger,T.Niehus,CRCPress
8. www.energymanagertraining.com
9. www.bee-india.nic.in

<u>Assessment</u>:

InternalAssessmentfor20marks:

Consisting**TwoCompulsoryClassTests**

First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory** andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part (b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

5.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-I						
CourseCode	**CourseName**	**Teachingscheme(Contact Hours)**		**CreditsAssigned**		
PEDIE1019	**Development Engineering**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE1019	**Development Engineering**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. TounderstandthecharacteristicsofruralSocietyandtheScope,NatureandConstraintsofruralDevelopment 2. TostudyImplicationsof73rdCAAonPlanning,DevelopmentandGovernanceofRuralAreas 3. An exploration of human values, which go into making a 'good' human being, a 'good'professional, a 'good' society and a 'good life' in the context of work life and the personallifeofmodern Indianprofessionals 4. Tounderstandthe NatureandTypeofHumanValuesrelevanttoPlanningInstitutions
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. Apply knowledge forRuralDevelopment. 2. Apply knowledge forManagement Issues. 3. Apply knowledge forInitiativesandStrategies 4. Developacumenfor highereducationandresearch. 5. Mastertheartofworkingingroupofdifferentnature. 6. Developconfidencetotakeupruralproject activities independently

Module	**Contents**	**Hours**
1	**IntroductiontoRuralDevelopment:** Meaning, nature and scope of development; Nature of rural society in India; Hierarchyof settlements; Social, economic and ecological constraints for rural development Rootsof Rural Development in India Rural reconstruction and Sarvodaya programme beforeindependence;ImpactofvoluntaryeffortandSarvodayaMovementonruraldevelopment;Constitutionaldirection,directiveprinciples;PanchayatiRaj-beginningof planningandcommunitydevelopment;Nationalextensionservices.	08
2	**Post-IndependenceRuralDevelopment:** BalwantRaiMehtaCommittee-threetiersystemofrurallocalGovernment;Needand scopeforpeople'sparticipationandPanchayatiRaj;AshokMehtaCommittee-linkagebetweenPanchayatiRaj, participationandrural development.	04
3	**RuralDevelopmentInitiativesinFiveYearPlans:** FiveYearPlansandRuralDevelopment;PlanningprocessatNational,State,RegionalandDistrict levels; Planning, development, implementing and monitoring organizations andagencies; Urban and rural interface - integrated approach and local plans; Developmentinitiatives and their convergence; Special component plan and sub-plan for the weakersection;Micro-eco zones;Databaseforlocalplanning;Needfordecentralizedplanning; Sustainableruraldevelopment.	06

4	**Post73rdAmendmentScenario:**73rdConstitutionAmendmentAct,including-XIschedule, devolution of powers, functions and finance; Panchayati Raj institutions -organizational linkages; Recent changes in rural local planning; Gram Sabha - revitalizedPanchayati Raj; Institutionalization; resource mapping, resource mobilization includingsocialmobilization;InformationTechnologyandruralplanning;Needforfurther amendments.	04
5	Values and Science and Technology Material development and its values; the challengeofscienceandtechnology;Values inplanningprofession,research andeducation. Types of Values Psychological values — integrated personality; mental health; Societalvalues — the modern search for a good society; justice, democracy, rule of law, valuesin the Indian constitution; Aesthetic values — perception and enjoyment of beauty;Moralandethicalvalues;natureofmoraljudgment;Spiritualvalues;differentconcepts;secularspirituality;Relativeandabsolutevalues;Humanvalues—humanismandhuman values;humanrights;humanvaluesasfreedom,creativity,love andwisdom.	10
6	**Ethics:**Canonsofethics;ethics ofvirtue;ethicsof duty;ethicsofresponsibility;Work ethics;Professionalethics;Ethicsinplanningprofession,researchandeducation	04

References:

1. ITPI,VillagePlanningandRuralDevelopment,ITPI,New Delhi
2. Thooyavan,K.R.HumanSettlements:A2005MAPublication,Chennai
3. GoI,Constitution(73rdGoI,NewDelhi Amendment)Act,GoI,NewDelhi
4. PlanningCommission,FiveYearPlans,PlanningCommission
5. Planning Commission, Manual of Integrated District Planning, 2006, Planning Commission NewDelhi
6. PlanningGuide to Beginners
7. Weaver,R.C., TheUrbanComplex,Doubleday.
8. Farmer,W.P.etal,Ethics inPlanning, AmericanPlanningAssociation,Washington.
9. How,E.,Normative EthicsinPlanning, JournalofPlanningLiterature, Vol.5, No.2,pp.123-150.
10. Watson, V., Conflicting Rationalities: -Implications for Planning Theory and Ethics, PlanningTheoryandPractice,Vol.4,No.4,pp.395–407

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part (b) will befromany moduleother thanmodule 3)
4. Only**FourquestionsneedtobesolvedSemesterVIIIInstituteLevelOptionalCourses**

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teaching scheme(Contact Hours)		CreditsAssigned		
		Theory	Pract./Tut.	Theory	Pract./Tut.	Total
PEDC201	Advanced PowerElectronics	3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDC201	AdvancedPower Electronics	20	20	20	80	3	-	-	100

CourseObjectives	**Toimpartknowledgeon** 1. Dctodcconversionwithisolation,theunderlyingprinciplesofconverteroperationandhenceto analyzedifferent converter circuits for powerconversion. 2. Designofmagneticssuchashighfrequencytransformersandinductors. 3. Modelingofconverteranddesignthecontrollerfordeeperunderstandinganddetailedanalysis. 4. Latest technologiesandresearch goingonin differentareas relatedtopowerelectronics.
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto** 1. Select anddesignmagneticsandpower electronic convertersfor abroadrangeof energyconversionapplications. 2. Modelanddesigncontrollers forthe closed loopoperationof powerconverters. 3. Apply the basic concepts of power electronics to design the circuits in the fields of AC and DCdrives, power generation and transmission and energy conversion, industrial applications,extractionofenergyfromrenewablesources. 4. Deliver technologicalsolutioninthefieldofpowerelectronics.

Module	Details	Hours
1	**Isolateddc todcconverters** Advantages of switching power supplies, unidirectional and bidirectional core excitation,fly back, forward, push-pull and bridge converters, Selection of converters for variousapplications,numericals.	08
2	**DesignofDC-DCconverters:** Selectionofdiode,controllabledevicesandcapacitorofBuck,Boost,Buck-BoostconvertersandFlybackconverters forvariousapplications. DesignofMagnetics:Areaproductapproach,designofhighfrequencyinductor,designofhighfrequencytransformer,numericals(Noderivationin qupaper).	05
3	**ControlMethods** PWMdutyratiocontrol,VoltagefeedforwardPWMcontrol,currentmodecontrol,slopecompensation,comparisonof currentmodeandvoltagemodecontrol.	04
4	**ModellingandCompensatordesign** StatespacemodelofvariousidealandnonidealBuck,BoostandBuck-BoostandFlybackdc to dc converters, state space averaging techniques, small signal analysis, transferfunction,feedbackcontrol,compensatordesign,StatespacemodelofVSIand compensatordesign.	10
5	**Multi-LevelInverter:**	05

	Needformultilevelinverters,Diodeclamped,flyingcapacitorandcascadedMLI,Phase shiftedandlevelshiftedPWMtechniques, Applicationsofmultilevelinverters.	
6	**Applicationsofpowerelectronicconverters** Comparisonofhardswitchingandsoftswitching,ZVS&ZCSresonantconvertersinhighfrequency applications,Convertersforextractingpowerfromrenewablesourceslike solarandwind,ConvertersforUninterruptedpowersupplies.	04

TextBooks:

1. N. Mohan, T. M. Undeland, W.P Robbins, —Power Electronics, Converters, Applications & Design,WileyIndia Pvt.Ltd.
2. M.H.Rashid,—HandbookofPowerElectronics",AcademicPress,2001.
3. DanielHart,"PowerElectronics",McGrawHillPublications2010.
4. JosephVithayathil,—PowerElectronics,TataMcGrawHill.
5. P.SBhimbra,"PowerElectronics",KhannaPublishers.
6. SimonAng,AlejandroOliva,"Power-SwitchingConverters"TaylorandFrancisgroup
7. RWEricksonandD Maksimovic,FundamentalofPowerElectronics Springer,2ndEdition.

OtherReferences/Journals

1. P.T.Krein, ElementsofPower Electronics ,OxfordUniversityPress.
2. L.Umanad,PowerElectronics:Essentials&Applications,Wiley.
3. IEEE Transaction journals, IECON, APEC and other power electronic related Conference Proceedingsetc.

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswill be randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDC202	**Digital Control ofElectricalDrives**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**Exam Duration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDC202	**DigitalControlof ElectricalDrives**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	To impartknowledgeondigital controlofelectrical drive
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Designdigitalcontrol schemeofDC-DC Converter 2. Designdigitalscalarcontrolschemeofthreephase inductionmotor 3. Designdigitalvectorcontrol schemeofthreephaseinductionmotor 4. Designdigitalcontrol schemeofBLDCMotor

Module	Details	Hours
1	**ModellingandAnalysisofElectricalDriveComponents:** Block diagram of DC drive, State space model of DC-DC converter (Buck/Boost), Smallsignal analysis of DC-DC converters. Modelling of DC Motors (Shunt motor). BlockdiagramofACdrive.Commonlyusedreferenceframes(d-qStationaryreferenceframeandsynchronouslyrotatingreferenceframe.StatespaceModelofACMotor(Inductionmotor),LargeSignalModellingofInverter.DigitalDataAcquisitionsystem,Voltage Sensors,CurrentSensors,FrequencySensorsandSpeedSensors.	07
2	**Digitalcontroldesign:** Practical Aspects of the Choice of Sampling Rate, Principles of Discretization, DigitalcontrollerwithBilinearTransformation,InverseZTransformtoDeriveDiscreteDomainEquations,FrequencyResponseandWarping,DigitalPIDcontroller.Digitalfilter implementation.Anti-WindUpLoopImplementation,ADCDelayConsideration.Selectionof DSPaccordingtothe Requirement.	06
3	**DigitalControlofDC-DCConverter:** Open Loop Control of Buck/Boost Converter, Selection of Power switches. Current,Voltage and Dual Loop Closed Loop Digital Control of DC-DC Converter, Digital ControlLoop Sampling Scheme, DC-DC Controller Design, Digital implementation of completesystem.	06
4	**SpeedController:** Basic Structure of the Speed-Controlled System, Open-loop and closed-loop TransferFunctions, Load Rejection of the Proportional Speed Controller, Proportional SpeedControllerwithVariableReference,ProportionalSpeedControllerwithFrictionalLoad,The Speed Controller with Proportional and Integral action, Transfer Functions of thesystemwithaPIcontroller,ParameterSettingandtheclosed-loopBandwidth,Discrete-timeImplementationofSpeedControllers,AnalysisofthesystemwithaPI Discrete-timeSpeedController.	06

5	**DigitalcontrolofthreephaseInductionmotor**: Open loop Speed Control Implementation of Induction Motor using Sine PWM andSpaceVectorPWMcontrollerorThirdHarmonicInsertiontechnique,SpeedEstimation AlgorithmUsingEncoderSignal,ClosedLoopScalarControlImplementation,FluxEstimation Algorithm, Indirect Vector Control Algorithm, Sine And Cosine Resolver forDirectVectorControl,DirectVectorControlAlgorithm,DirectTorqueControlAlgorithm Implementation.	08
6	**DigitalControlofBLDCMotor, PMSMandSwitchedReluctanceMotor:** Hall basedSensors, Look upTableFormationbasedonHall SensorsOutput,DSPImplementation:SpeedandTorqueControlusingVoltageandCurrentControlAlgorithms, Sensorless Control of BLDC Motor Drive, V/f Control of PMSM Motor,Vector control of PMSM Motor, Current Control of SRM with the help of PositionSensors,Digital ICs used for differenttypesofmotorcontrol	06

TextBooks:-

1. Digital Control of Electrical Drives (Power Electronics and Power Systems) by Slobodan N. Vukosavic,Springer.
2. M. B. Patil, M. C. Chandorkar, V. Ramanarayanan, V. T. Ranganathan, Simulation of Power ElectronicCircuits.Narosa Series inPower andEnergy System,2009.
3. ModernPowerElectronicsandAC Drives byB.K.Bose, PrenticeHallPTR
4. Advanced Electric Drives: Analysis, Control, and Modeling Using MATLAB / Simulink, Ned Mohan,Wiley,2014.

References:-

1. IndustrialMotionControl:MotorSelection,Drives,ControllerTuning,Applications,HakanGurocak,Wiley,2016.
2. ElectricMotorDrives:Modeling, AnalysisandControlby Krishnan.R,PHI.
3. FromContinuous-TimesDomaintoMicrocontrollerCodeBy JonathanDodge,P.E.
4. DesigningaTMS320F280xBasedDigitallyControlledDC-DCSwitchingPowerSupplybyTexasInstruments
5. SensorlessFieldOrientedControlof3-PhaseInductionMotors UsingF2833x byTI
6. Scalar(V/f)Controlof3-PhaseInductionMotorsbyTI
7. BLDCMotorControlwithHallSensorsbasedonFRDM-KE02Z.

Assessment:
InternalAssessmentconsistsof twotestsoutofwhich;oneshouldbecompulsoryclasstest (onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:
1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, based onentiresyllabuswhereinsubquestionsof2to5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfromallthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teaching scheme(Contact Hours)		CreditsAssigned		
PEDPE2011	Power ElectronicsinPowerSystem	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		Internal Assessment			End Sem. Exam	ExamDuration(in Hrs)			
		Test1	Test2	Avg					
PEDPE2011	PowerElectronics inPowerSystem	20	20	20	80	3	--	--	100

CourseObjectives	1. To know the basic principle of conventional active and reactive power flow control in powersystemsandproblemsassociatedwith longdistancepowertransmission. 2. To make students aware how power electronics devices can be used to find solution to theproblemsin longdistancepowertransmission
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. Selectandimplementpropercompensatortosolvetheproblemsoccurringinlongdistancepowertransmission 2. IllustratetheoperationaldetailsofSeriesandShuntcompensators 3. Describe theobjectivesofloadcompensation 4. StatethebasicoperatingprincipalofUPFC

Module	Contents	Hours
1	**Introduction:** Steady state and dynamic problems in AC systems- Transmission interconnections- Flow of power in an AC system- Loading capability- Power flow and dynamic stabilityconsiderationsofatransmissioninterconnection.Relativeimportanceofcontrollable parameters.BasictypesofFACTScontrollers.	08
2	**Staticshuntcompensators:** Objectives of shuntcompensation,Methods of controllableVargeneration.VariableimpedancetypestaticVargenerators(TCR,TSR,TSC,FC-TCR),Switchingconverter typeVargenerators.	08
3	**Staticseriescompensation:** Objectivesofseriescompensation-Variableimpedancetypeseriescompensation-TSSCandTCSC.Switchingconvertertypeseriescompensators–SSSC.	06
4	**Staticvoltageandphaseangleregulators:** Objectivesofvoltageandphaseangleregulators,ApproachestoTCVRandTCPAR,switching converterbasedvoltage andphaseangle regulators.	06
5	**Load Compensation:** Objectives ofloadcompensation.Compensatingsinglephaseloadsusing DSTATCOM,Idealthreephaseshuntcompensator structure,SeriescompensationofpowerdistributionsystemusingDVR.	06
6	**UnifiedPowerFlowController(UPFC):** Basicoperatingprinciple,Conventionaltransmissioncontrol capabilities	05

TextBooks:

1. HingoraniN.G.&GyugiL.,UnderstandingFACTS:ConceptsandTechnologyof Flexible ACTransmissionSystems, Wiley-IEEEPress
2. TimothyJ.E.Miller,ReactivepowercontrolinElectricSystems, WileyIndiaEdition.

ReferenceBooks:

1. YongHuaSong—FlexibleACTransmissionSystem,InstitutionofElectricalEngineers,London
2. Arindam Ghosh and Gerard Ledwich, — Power Quality Enhancement Using Custom Power Devices,KluwerAcademicPublishers

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions,eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfrom allthemodules.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teaching scheme(Contact Hours)		CreditsAssigned		
PEDPE2012	IndustrialLoad Modelling andControl	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration(in Hrs)			
		Test1	Test2	Avg					
PEDPE2012	IndustrialLoad Modelling andControl	20	20	20	80	3	-	-	100

CourseObjectives	1. To understandtheenergydemandscenario 2. To understandthemodellingofloadanditseaseto studyloaddemandindustrially 3. Toknow Electricitypricingmodels 4. 4.StudyReactivepowermanagementinIndustries
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. UnderstandtheroleofIndustrialloadManagementinpresentelectricalenergyscenario 2. Understanddifferentloadcontroltechniques inindustriesanditsapplication. 3. Understandreactive powermanagement anditscontrols. 4. Understandvariouscoolingandheatingloadsitscontrolstrategies 5. Understandcaptive powermanagementanditscontrolstrategies 6. Understandandapplydifferentoptimaloperationstrategiestoreducedemandofelectricityduring peak time.

Module	Details	Hours
1	**Introduction:** Electric Energy Scenario-Demand Side Management-Industrial Load Management. LoadCurves-LoadShapingObjectives-Methodologies.Barriers;ClassificationofIndustrialLoads- Continuous and Batch processes -Load Modelling, Electricity pricing – Dynamicandspot pricing–Models.	08
2	**LoadControlMethods:** Directloadcontrol-Interruptibleloadcontrol.Bottomupapproach-scheduling-Formulationof loadmodels- Optimizationandcontrolalgorithms - Casestudies.	07
3	**ReactivePowerManagement** Reactivepowermanagementinindustries-controls-powerqualityimpactsapplicationoffiltersEnergy savingin industries.	06
4	**CoolingandHeatingLoads:** Loadprofiling-Modelling.Coldstorage-Types-Controlstrategies.Optimaloperation-Problemformulation- Casestudies.	06
5	**CaptivePowerManagement:** Captivepowerunits-Operatingandcontrolstrategies-PowerPooling-Operationmodels.Energy banking-IndustrialCogeneration	06
6	**OptimalOperationStrategies:** SelectionofSchemesOptimalOperatingStrategies.Peakloadshaving-Constraints-Problemformulation-Casestudy.IntegratedLoadmanagementforIndustries	06

BooksRecommended:

1. C.O.Bjork“IndustrialLoadManagement-Theory,PracticeandSimulations",Elsevier,theNetherlands,1989.
2. C.W.GellingsandS.N.Talukdar,“Loadmanagementconcepts,” IEEEPress,NewYork,1986,pp.3-28.
3. Y.ManichaikulandF.C.Schweppe,"PhysicallybasedIndustrialload",IEEETrans.onPAS,April1981.
4. H.G.Stoll,"LeastcostElectricity UtilityPlanning”,WileyIntersciencePublication,USA,1989.
5. I.J.NagarathandD.P.Kothari,ModernPowerSystemEngineering.,TataMcGrawHillpublishers,NewDelhi,1995.
6. IEEEBronzeBook-“RecommendedPracticeforEnergyConservationandcosteffectiveplanninginIndustrialfacilities”, IEEE Inc, USA.

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof2to 5markswill beasked.
4. Remainingquestionswillberandomlyselectedfromallthemodules

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teaching scheme(Contact Hours)		CreditsAssigned		
PEDPE2013	DSPApplicationsin Power ConversionSystems	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract/ Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration(in Hrs)			
		Test1	Test2	Avg					
PEDPE2013	DSP Applicationsin PowerConversion Systems	20	20	20	80	3	-	-	100

CourseObjectives	**Toimpartknowledgeon** 1. Realtimeapplicationsusing DSPprocessors 2. InterfacingofDSPwith variouspowerconverters 3. ProgrammingDSP forPowerandcontrolapplications
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. UsemathematicaltoolsforDSPapplicationsin realtime power andcontrolapplications 2. ProgramtheDSPforvariousbuildingblocksofrealtime powerandcontrolapplications 3. DesignandimplementDSPbasedcontrolofpowerElectronicconverters 4. Modelandanalyzetheclosed looppowerElectronicsystem 5. Illustratethe useofDSP invariousindustrialapplications

Module	Details	Hours
1	**Introduction:** DSP/DSC for real time power and control applications, requirements, analog and digitalinterfaces. ReviewofmathematicaltoolsforDSPapplications:numericalintegration:Euler'simplicitand explicit method, Heun's Method, Trapezoidal Method; Implementation of digitalfiltersandtransformations,PLL,Harmonicoscillator,Harmonicextraction.	08
2	**DSPbasedDC-DCConverterControl:** Buckconverter,BoostconverterandBidirectionalConverter:closedloopcontrolimplementation: hardware and control program for current, voltage and power control.Controlimplementationwith PI,TypeII andTypeIII controller	08
3	**DSPbasedDC-ACConverterControl:** StandaloneandGridtiedinverter(singleandthreephase):closedloopcontrolimplementation: hardwareandcontrolprogramforcurrent,voltageandpowercontrol.	08
4	**DSPbasedAC-DCConverterControl:** ActiveFrontEnd(AFE)converter:closedloopcontrolimplementation:hardwareandcontrolprograming	07
5	**DSPbasedmulti-convertersystem:** Multi-stageconvertersystemcontrolwithDSP,requirementofanalog/digitaland communicationinterfaces	04
6	**DSPapplicationsinIndustrialDomains:** OverviewofDSPapplicationsinTractionconverters,ElectricVehicles,UPSsystems	04

ReferenceBooks:

1. DigitalSignalProcessinginPowerElectronicsControlCircuits byKrzysztofSozanski,Springer
2. DigitalSignalProcessinginPowerSystemProtectionandControlbyWaldemarRebizant,JanuszSzafran,andAndrzejWiszniewski, Springer.
3. DigitalPowerElectronicsandApplicationsby*FangLinLuo,HongYeandMuhammadRashid,*ElsevierAcademic Press.
4. DigitalSignalProcessinginPowerElectronicsControlCircuits byKrzysztofSozanski,Springer
5. DSPBasedElectromechanicalMotionControlbyHamidToliyatandStevenCampbell,CRCPress

WebReferences:

1. https://training.ti.com/c2000-f2837xd-microcontroller-one-day-workshop-series
2. https://software-dl.ti.com/trainingTTO/trainingTTO_public_sw/c28x28379/F2837xD_Microcontroller_M
3. https://www.ti.com/microcontrollers-mcus-processors/microcontrollers/c2000-real-time-control-mcus/overview.html
4. TheEssentialGuideforDevelopingwithC2000™RealTimeMicrocontrollers:TexasInstruments

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillberandomlyselectedfromallthemodules

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teaching scheme(Contact Hours)		CreditsAssigned		
PEDPE2021	Design of ElectricVehiclesSystems	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3		3

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Pract /Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration(in Hrs)			
		Test1	Test2	Avg					
PEDPE2021	Design ofElectricVehicles Systems	20	20	20	80	3	-	-	100

CourseObjectives	1. To illustratethedesignphilosophiesusedintheEVdomain. 2. Toexploretheselectionofpowerandcontrolarchitecture ofEVdrives 3. TostudythedesignaspectsofEVbatterypacksandotherauxiliarysystems
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeable:** 1. To selectandsizetheelectricmotorforaparticularEVapplicationandperformance criteria 2. To selectandsizethe batterypacktomeet desiredEVperformanceand 3. TodesigntheEVdrivesystemwithfunctionalsafetyconsiderations. 4. Toillustratetheuseofhybridenergysource for EVperformanceimprovement 5. ToillustratethedesignaspectsofAutomotiveSubsystem 6. To designtheEV chargersandcharginginfrastructure

Module	Details	Hours
1	**SelectionandSizingofEVMotors:** ElectricVehiclemodelling,Tractiveforcecalculations,Designconsiderationsfor2W,3Wand 4W EVs; Torque, power and Speed requirement, Vehicle Power Demand VehiclePerformanceEnvelope,andVehiclePowerEnvelope;VehiclePowerDemandduring DrivingCycles.DesignconsiderationsforEVmotorsandtheircoolingsystem.	06
2	**SelectionandSizingofOn-boardEnergyResource:** Selection of type of Battery pack for 2W, 3W and 4W EVs; Battery pack sizing: Designconsiderations: Range per charge, range anxiety, EV motor power requirement; High-VoltageCablingandDisconnects,SafetyinBattery Design,Testingfor safety. Selection and sizing of Fuel cell for FCEV, design considerations; Battery-ultra-capacitorhybridcombinationsizing,performanceanalysis.	08
3	**AutomotiveSubsystemDesign:** Electronic Control Unit (ECU) and its Control Features, Communications between ECUs,Control Software Development: Software-in-the-Loop (SIL) Simulation and Hardware-in-the-Loop(HIL) Simulation. Acceleration and braking control, regenerative braking; Design considerations of HVACcontroller	05
4	**EVSystemIntegration:** EMCdesignonECUlevel,EMCdesignonsystemlevelandinspecialsubsystems,Radiated emissionsandConductedemissions,EMIEMCmeasurements.	04
5	**DesignofChargingInfrastructure:** DesignconsiderationsforACcharger:vehicleinterfaceandchargingprotocoldesign.applicablechargingstandards.	08

	DesignofOn-BoardCharger(OBC)- Schematic,powertopologyandcontrol,Powercapacities,regenerativebrakingcontrol. DesignconsiderationsofDCfastcharger:vehicleinterfaceandchargingprotocoldesign.Connectivityand applicablechargingstandards Installationguidelinesandgridrequirementforchargerinstallations.	
6	**DesignwithFunctionalSafety:** FunctionalSafetyrequirementsofAutomotiveElectronics;ASILidentificationandsafetygoalfinalization,ISO26262. EnergyStorageintegrity/protection:ruptureandtoxicgasmanagement;Unintendedvehicle movement,shockprotection.	08

Text/ReferenceBooks:-

1. DesignandControlofAutomotivePropulsionSystemsbyZongxuanSunandGuomingZhu,CRCPress,2015
2. ElectricVehicleMachinesandDrivesDesign,AnalysisandApplicationbyK.T.Chau,IEEEPress,andWiley,2015
3. EMCandFunctionalSafetyofAutomotiveElectronicsbyKaiBorgeest,IET,2018

WebsiteReference/VideoCourses:

1. **NPTEL Web Course:** Electric Vehicles - Part 1 by PROF. AMIT KUMAR JAIN Department of ElectricalEngineeringIIT Delhi; https://nptel.ac.in/courses/108/102/108102121/
2. **NPTEL Web Course:** Fundamentals of Electric vehicles: Technology & Economics**,** by Prof. AshokJhunjhunwala, Prof. Prabhjot Kaur, Prof. Kaushal Kumar Jha and Prof. L Kannan, IIT Madras,https://nptel.ac.in/courses/108/106/108106170/
3. **NPTEL Web Course:** Introduction to Hybrid and Electric Vehicles by Dr. Praveen Kumar and Prof. S.Majhi,IITGuwahati,https://nptel.ac.in/courses/108/103/108103009/

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonlive problemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to5markswill beasked.
4. Remainingquestionswillberandomlyselectedfromallthemodules

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teaching scheme(Contact Hours)**		**CreditsAssigned**		
PEDPE2022	**Design of PowerConverters**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration(in Hrs)**			
		Test1	**Test2**	**Avg**					
PEDPE2022	**Design of PowerConverters**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

Course Objectives	1. Tounderstandandselecthighpowerdevices,gainknowledgeaboutpowermodules,suitablepackagingandlatestmarket trends. 2. Tounderstandandanalysehighpowerconvertersandtheprotectionneededfortheconverters. 3. Tokeepabreastwiththe latesttechnologiesandresearchgoingonindifferentareasrelatedto highpowerconverters. 4. Toenhance the knowledgeof practicalaspectsinthedesignofPowerConverters. 5. To delivertechnologicalsolutioninthefieldof powerelectronics.
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto** 1. Analyzeandunderstandhighpowerdevicesandpracticalissuesinimplementinghighpowerconverters. 2. Understandprotectionaspectsanddesignconsiderationstobuildproperpowerelectronicssystems. 3. Designclosedloopcontrolanddiscretizecontrollersforusingdigitalcontrolmethods. 4. Analyzeanddesignconvertersinthefieldsofdrives,powergenerationandenergyconversion,industrialapplications,extractionof energyfromrenewable sources.

Module	Details	Hours
1	**Highpowerswitchingdevicesanddrivers:** Issueswithconventionalswitchesinhighpowerapplications,Viewofpowerdevicemarkettrend,seriesconnecteddevices,voltageequalizationtechniques-staticand dynamic,intelligentpowermodules,packagesforhighpowerdevices,driversforwidebandgap devices.	04
2	**HighpowerconvertersandProtection:** Review of Multi level inverters, Cascaded H bridge multilevel inverters, Modular Multilevelconverters. PracticalAspectsinbuildingThree-PhasePowerConverters-Motordrives,Gridapplications. Protectionaspects-Overcurrent,Overvoltage,temperature,snubberdesign-component selection, basics of resonant snubber and regenerative snubber, numericalsincluded.	10
3	**Designconsiderations:** Electricalspecifications,Mechanicalspecifications,Environmentalspecifications,EMI/EMC specifications, Hardware specifications, Thermal Management , Selection ofswitchingfrequency, Selectionofswitchingdeviceandtopology,cost.	06

4	**Closed-Loopcontrol:** Analog PWM controllers**,** Digital control-advantages**,** Signal conditioning and sampling,digital implementation of PWM modulator-single update and double update mode, PI &PRcontrollerdiscretization,effectofcomputationaldelay,Processorsinconverter control,Gridsynchronizationtechniques, introductiontonon-linearcontrolmethods.	08
5	**DesignofHighpowerconvertersfordrives:** Requirementsandchallenges**,s**witchingdeviceconstraints,converterconfigurations,control aspects,casestudiesofdesignofdriveapplication.	05
6	**DesignofGridinterfacedconverters:** Requirements and challenges, high power grid interfaced converters, current control,gridsynchronization,filterdesign,dclinkvoltagecontrol,casestudiesongridinterfaci ngofrenewableenergy sources.	06

TextBooks:

1. DorinO.Neacsu,"SwitchingPowerConverters,MediumandHighPower",CRCpress,Taylor&Francisgroup,se condedition,2017.
2. BinWu,"HighPower ConvertersandAC drives", IEEEpress,JohnWiley &Sons.
3. N. Mohan and T. M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley &Sons,2007.
4. SimonAng,AlejandroOliva,"Power-SwitchingConverters",TaylorandFrancisgroup.
5. AYazdani,R.Iravani,"Voltage-SourcedConvertersinPowerSystems",Wiley,IEEEpress.
6. B.JayantBaliga,"SiliconCarbide PowerDevices",WorldScientific,2005.

ReferenceBooks:

1. R.Teodoresco,M.Liserrie,P.Rodr´ıguez"GridConvertersforPhotovoltaicandWindPowerSystems",JohnWil ey andSons.
2. L.Umanad,"PowerElectronics:Essentials& Applications",Wiley.
3. V.Ramanarayanan,"CourseMaterialonSwitchedMode PowerConversion",2007.
4. M.Jamil,M.Rizwan,D.PKothari,"GridIntegrationofSolarPhotovoltaicSystems",CRCpress,Taylor&Francis.
5. PeterFriedrichs,T.Kimoto,L.LeyandG.Pensl,"SiliconCarbide,Volume2:PowerDevicesandSensors",WileyP ublications,2011.
6. RelevantPaperspublishedinreputedJournals,Conference/NPTELlectures.

Assessment:

InternalAssessmentconsistsof twotestsout ofwhich;one should becompulsoryclass test(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillberandomlyselectedfromallthemodules

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teaching scheme(Contact Hours)**		**CreditsAssigned**		
PEDPE2023	**Power Converters forRenewableEnergy**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**		**3**

Course Code	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration(in Hrs)**			
		Test1	**Test2**	**Avg.**					
PEDPE2023	**PowerConverters for RenewableEnergy**	**20**	**20**	**20**	**80**	**3**	**-**	**-**	**100**

CourseObjectives	1. Tointroducethe distributedgenerationsystem basedonrenewableenergyresources. 2. Toknow thepracticalaspectsofdesignof powerconvertersfor renewableenergy sources. 3. Toknowthecontrolimplementationfor powerconverters.
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeable:** 1. Toillustrateoperatingprinciple andcharacteristicsofvariousRES 2. Toidentifyanddescribevarioustopologiesof DGsbasedonuseofvariouscombinationsofRES. 3. Todesignthepowerconvertersforsolar PVapplications. 4. Toidentifyanddescribethedesignconsiderationsforthepowerconvertersforwindenergysystems. 5. Toidentifyanddescribethedesignconsiderationsforthepowerconvertersforfuelcellsystems. 6. Tomodelanddesigncompensatorforpowerconvertersoperatinginvoltageandcurrentcontrolmode.

Module	**Details**	**Hours**
1	**Introduction to renewable sources:** Review of renewable energy sources, operatingprinciplesandcharacteristicsof:SolarPV,WindEnergySystems(WES),Fuelcells;Economicsandstatisticsrelatedtorenewableenergy.Reviewofenergystoragesystems withBatteriesandultra-capacitors.Categorizationofenergysources	4
2	**Distributedgenerationsystem:**Basicconcepts,varioustopologiesanddesignconsiderationsforstandalonesystemsandgridconnectedsystems,Powerqualityand protectionissues,reviewofregulatorystandardsrelatedtovariousaspectsofrenewableenergysystems	4
3	**DesignofpowerconvertersforSolarPV:**MPPT(maximumpowerpointtracking),DesignofDC-DCconvertersfor MPPT, MPPTalgorithms,Implementationof MPPT controlthroughDSPcontrollers. Topologiesforgridconnectedandstandaloneapplications:singlephaseandthreephasesystems,DesignofmultistagesolarPVgridconnectedandstandalonesystems.Lowandhighpower Applications.IntegrationofES-batteryandultra-capacitorforperformance improvement,ConvertersforPVbasedchargingstationsforEV	10
4	**Design of power converters for WES:** Topologies of WES, design considerations for WESwith rectifier / inverter system, Power Converters for Doubly Fed Induction Generators(DFIG)inWindTurbines,Matrixconvertertopology for gridconnectedsystem.	06

5	**Design of power converters for Fuel Cell:** Review of fuel cell technology, Design of DC-DC converters for PEM fuel cell, MPPT in Fuel Cell, Design considerations for multi-stageconverter/invertersystemfor gridconnectedoperations.	06
6	**Designofcompensatorforvoltageandcurrentcontrolmodes:**Modellingofthesystem,derivation of transfer function compensator for voltage and current control modes,design of PI and Type III controller in power conditioning system for renewable energysources.	06

TextBooks:

1. PowerElectronics,Converters,Applications&Design ,N.Mohan,T.M.Undeland,W.PRobbins,WileyIndia Pvt.Ltd.
2. VoltageSourceConvertersinPowerSystems:Modeling,ControlandApplications,AmirnaserYezdani,andReza Iravani, IEEEJohnWiley Publications
3. PowerSwitchingConverters:Medium andHighPower,DorinNeacsu,CRCpress,Taylor&Francis,2006
4. M.H.Rashid,—PowerElectronicsHandbook ,AcademicPress,2001

Referencesbooks/websites:

1. DSPBasedElectromechanicalMotionControl,HamidToliyatandStevenCampbell,CRCPress
2. DigitalSignalProcessors-Architectures,Implementations,andApplications,SenM.KuoandWoon-SengGanPrentice Hall
3. FuelCellSystem,Leo J.M.J.Blomen andmichaelN.Mugerwa,New York,PlenumPress,1993.
4. WindEnergyExplained,theorydesignandapplications, J.F.Manwell,J.G.McGowanWileypublication
5. FuelCellSystemsExplained,JamesLarminie,AndrewDicles,Wileypublication
6. PrinciplesofSolarEngineering ,D.Y.Goswami,F.KreithandJ.F.Kreider,TaylorandFrancis,Philadelphia,2000
7. BiomassRegenerableEnergy,D.D.HallandR. P.Grover, JohnWiley, NewYork,1987.

Assessment:

InternalAssessmentconsistsoftwotests outofwhich;one should becompulsoryclasstest(onminimum02Modules)andtheotheris eithera classtestor assignmentonliveproblemsor courseproject.

TheoryExamination:

1. Questionpaperwillcompriseof6questions, eachcarrying20marks.
2. Totalfourquestionsneedto besolved.
3. Q.1 willbe compulsory, basedonentiresyllabuswhereinsubquestionsof 2to 5markswill beasked.
4. Remainingquestionswillbe randomlyselectedfrom allthemodules

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDL201	**DSP ApplicationsLab**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		--	**2**	**--**	**1**	**1**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration(in Hrs)**			
		Test1	**Test2**	**Avg**					
PEDL201	**DSPApplications Lab**	--	--	--	--	--	**25**	**25**	**50**

CourseObjectives	To impartknowledgeon 1. UseofDSPdevelopmentboardsandDSP programmingplatform 2. ProgramDSPfortheuseofvariousonboardperipherals 3. UseofDSP forcontrolof powerelectronic converters
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. PrograminDSP forspecificapplications 2. IntegrateDSPprocessorwithexternalapplications 3. DesignandimplementclosedloopcontrolofpowerelectronicconvertersusingDSP

HardwareandSoftwaretools tobeused

- StudentscanuseDSPdevelopmentboards(TexasInstrumentsC2000serieslikeTMS320F28069/TMS320F28335/ TMS 320F28379D or similar with software platform (Code Composer studio) to perform thesuggested experiments. Use of training material (videos and lab manuals) available on Texas Instrumentswebsiteis recommended.
- Use of emulation platforms with DSP target boards facility can also be done to conduct recommended labexperiments

Listofsuggestedexperiments:

A. UseofDSPPeripherals:(minimumthree)

1. MathematicalcalculationsusingDSP
2. Sinewave generationusingDSP
3. Useof Graphutility andrealtimedebugginginterfacewithDSP
4. ADC applicationwithDSPboard
5. PWM(singlephaseandthreephase)generation
6. Useof GPIOfor status/ indications
7. Useofcommunicationprotocols
8. UseofQEP/ Capturemodule forSpeedmeasurement

B. DSPforPowerConverterApplication(minimumTwo)

1. DSPbased OpenloopoperationofDC-DCconverter
2. DSPbased ClosedLoopoperationofDC-DCconverter
3. DSPbased Openloopoperationof inverter
4. DSPbasedClosedloopoperationofinverter
5. DSPbasedPWM rectifier

C. DSPbasedPowerElectronicSystem(minimumone)

1. DSPbasedElectricdrive:InductionmotorwithV/Fcontrol
2. DSPbasedBLDCmotordrive
3. DSPbased LEDlampcontrol
4. DSPbaseddatatransferbetweentwosystemswithcommunicationinterface.

ReferenceBooks:

1. DigitalSignalProcessinginPowerElectronicsControlCircuits byKrzysztofSozanski,Springer
2. DigitalSignalProcessinginPowerSystemProtectionandControlbyWaldemarRebizant,JanuszSzafran,andAndrzejWiszniewski, Springer.
3. DigitalPowerElectronicsandApplicationsby*FangLinLuo,HongYeandMuhammadRashid,*ElsevierAcademic Press.
4. DigitalSignalProcessinginPowerElectronicsControlCircuits byKrzysztofSozanski,Springer
5. DSPBasedElectromechanicalMotionControlbyHamidToliyatandStevenCampbell,CRCPress

WebReferences:

1. https://training.ti.com/c2000-f2837xd-microcontroller-one-day-workshop-series
2. https://software-dl.ti.com/trainingTTO/trainingTTO_public_sw/c28x28379/F2837xD_Microcontroller_M
3. https://www.ti.com/microcontrollers-mcus-processors/microcontrollers/c2000-real-time-control-mcus/overview.html
4. TheEssentialGuideforDevelopingwithC2000™RealTimeMicrocontrollers:TexasInstruments

Termwork:

Termworkshallconsistof**minimumsixexperiments.**

ExperimentsPerformance	:10marks
Attendance	: 05marks
Journal	: 10marks

Thefinalcertificationandacceptanceoftermworkensures theminimum passingintheterm work.

OralExamination:

Oralexaminationwill bebased onentirelabwork

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teaching scheme(Contact Hours)**		**CreditsAssigned**		
PEDSBL201	**Power ElectronicsDesignLab-II**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		--	2	--	1	1

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**Exam Duration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDSBL201	**PowerElectronics DesignLab-II**	--	--	--	--	--	50	50	100

CourseObjectives	**Toimpartknowledgeon** 1. Designofmagneticsinhighfrequencyapplications 2. Designof closedloopcontrolof powerelectronic converters
CourseOutcomes	**Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto:** 1. IntegrateandprogramDSPforcompletePowerElectronicSystem 2. Designmagneticcomponentsofpowerelectronicconverters 3. Designclosedloopcontrolofpowerelectronicconverters andimplementit.

Listofsuggestedexperiments:

1. GenerateaDSPcodeforapplicationslikeMPPT/PLL/SVM/anyotherrelatedtoPEandDrivesanditstesting.
2. InductordesignanditsfabricationforBuckorBoostorBuck-BoostDC-DCconverter(anyoneconverter)
3. TransformerDesignanditsFabricationforanyisolatedDC-DCconverter
4. DesignandImplementationofclosedloopcontrolofBuckorBoostorBuck-BoostDC-DCconverterforswitchedmodepower supplies
5. DesignandImplementationofanyone isolatedDC-DC converterinclosedloop
6. DesignandImplementationofanyPowerElectronicconverterin closedloop

AnyotherdesignexercisebasedonPowerconvertersspecifictoapplicationsinvariousdomains.

References:

1. Mohan,Ned.et.al,"PowerElectronicsConverters,ApplicationsandDesign",WileyIndiaPvt.Ltd.,NewDelhi.
2. L.Umanand,Bhatt,"DesignofMagneticComponentsforSwitchedModePowerConverters",JohnWiley&Sons
3. NPTELcourseon"Designof PowerElectronic Converters",Prof. ShabariNath,IITGuwahati.
4. NPTELcourseon"AdvancedPowerElectronicsandControl",Prof.AvikBhattacharya,IITRoorkee.

Termwork:

Term work shall consist of minimum Two experiments.ExperimentsPerformance:10marks
Attendance :05marks
Journal :10marks

Thefinalcertificationandacceptance oftermworkensures theminimum passingintheterm work.

OralExamination:

Oral examinationwill bebased onentirelabwork.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE2011	**ProjectManagement**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE2011	**Project Management**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1. To familiarize the students with the use of a structured methodology/approach for each andevery unique project undertaken, including utilizing project management concepts, tools andtechniques. 2. Toappraisethestudentswiththeprojectmanagementlifecycleandmakethemknowledgeableabout thevarious phasesfromprojectinitiationthroughclosure.
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1. Applyselectioncriteriaandselectanappropriateproject fromdifferentoptions. 2. Writeworkbreakdownstructureforaprojectanddevelopaschedulebasedonit. 3. Identifyopportunitiesandthreatstotheprojectanddecideanapproachtodealwiththemstrategically. 4. UseEarnedvalue techniqueanddetermine &predictstatusofthe project. 5. Capturelessonslearnedduringprojectphasesanddocumentthemforfuture reference

Module	**DetailedContents**	**Hours**
1	**ProjectManagementFoundation:** Definition of a project, Project Vs Operations, Necessity of project management, Tripleconstraints, Project life cycles (typical & atypical) Project phases and stage gate process.Role of project manager, Negotiations and resolving conflicts, Project management invariousorganizationstructures, PMknowledgeareasasperProjectManagement Institute(PMI)	05
2	**InitiatingProjects:** How to get a project started, selecting project strategically, Project selection models(Numeric /Scoring Models and Non-numeric models), Project portfolio process, Projectsponsorandcreatingcharter;Projectproposal.Effectiveprojectteam,Stagesofteam development&growth(forming,storming,norming&performing),teamdynamics.	06
3	**ProjectPlanningandScheduling:** Work Breakdown structure (WBS) and linear responsibility chart, Interface; Co-ordination and concurrent engineering, Project cost estimation and budgeting, Topdownandbottomsupbudgeting,NetworkingandSchedulingtechniques.PERT,CPM, GANTTchart,IntroductiontoProjectManagementInformationSystem (PMIS).	08

4	**PlanningProjects:** Crashingprojecttime,Resourceloadingandlevelling,Goldratt'scriticalchain,ProjectStakeholdersandCommunicationplan Risk Management in projects: Risk management planning, Risk identification and riskregister,Qualitativeandquantitativerisk assessment,Probabilityandimpactmatrix. Riskresponsestrategiesforpositiveandnegativerisks	06
5	**5.1 ExecutingProjects:** Planning monitoring and controlling cycle, Information needs and reporting, engagingwith all stakeholders of the projects, Team management, communication and projectmeetings **5.2 MonitoringandControllingProjects:** Earned Value Management techniques for measuring value of work completed; Usingmilestonesformeasurement;change requestsandscope creep,Projectaudit **5.3 ProjectContracting** Projectprocurementmanagement,contractingandoutsourcing,	08
6	**6.1 ProjectLeadershipandEthics:** Introductionto projectleadership, ethicsin projects,Multiculturalandvirtual projects **6.2 ClosingtheProject:** Customer acceptance; Reasons of project termination, Various types of projectterminations (Extinction, Addition, Integration, Starvation), Process of projecttermination, completing a final report; doing a lessons learned analysis; acknowledgingsuccesses and failures; Project management templates and other resources; Managingwithoutauthority; Areasoffurther study.	06

REFERENCES:

1. ProjectManagement:Amanagerialapproach,JackMeredith&SamuelMantel,7th Edition,WileyIndia
2. AGuidetotheProjectManagementBodyofKnowledge(PMBOK®Guide),5th Ed,ProjectManagement InstitutePA,USA
3. ProjectManagement, GidoClements,CengageLearning
4. ProjectManagement,Gopalan,WileyIndia
5. ProjectManagement,DennisLock,9th Edition,GowerPublishingEngland

Assessment:

InternalAssessmentfor20marks:

Consisting**TwoCompulsoryClassTests**

First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part(b)will be fromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDIE2012	FinanceManagement	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE2012	Finance Management	20	20	20	80	3	--	--	100

CourseObjectives	1. Tofamiliarizethestudentswiththeuseofastructuredmethodology/approachforeachandeveryuniqueprojectundertaken,includingutilizingprojectmanagementconcepts,toolsandtechniques. 2. Toappraisethestudentswiththeprojectmanagementlifecycleandmakethemknowledgeable aboutthevarious phasesfrom projectinitiationthroughclosure.
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 UnderstandIndianfinancesystemandcorporate finance 2 Takeinvestment,financeaswellasdividenddecisions

Module	DetailedContents	Hours
1	**Overview of Indian Financial System:** Characteristics, Components and Functions ofFinancialSystem. **Financial Instruments:** Meaning, Characteristics and Classification of Basic FinancialInstruments — Equity Shares, Preference Shares, Bonds-Debentures, Certificates ofDeposit,andTreasury Bills. **Financial Markets:** Meaning, Characteristics and Classification of Financial Markets — CapitalMarket, MoneyMarket andForeignCurrencyMarket **FinancialInstitutions:** Meaning,CharacteristicsandClassificationofFinancial Institutions—CommercialBanks,Investment-MerchantBanksandStockExchanges	06
2	**Concepts of Returns and Risks:** Measurement of Historical Returns and ExpectedReturns of a Single Security and a Two-security Portfolio; Measurement of HistoricalRiskandExpected RiskofaSingle Securityanda Two-securityPortfolio. **TimeValueofMoney:** Future ValueofaLumpSum,OrdinaryAnnuity,andAnnuity Due; Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; ContinuousCompoundingandContinuousDiscounting.	06
3	**Overview of Corporate Finance:** Objectives of Corporate Finance; Functions ofCorporate Finance—Investment Decision, Financing Decision, and Dividend Decision.**Financial Ratio Analysis:** Overview of Financial Statements—Balance Sheet, Profit andLoss Account, and Cash Flow Statement; Purpose of Financial Ratio Analysis; LiquidityRatios;EfficiencyorActivityRatios;ProfitabilityRatios;CapitalStructureRatios;Stock MarketRatios;LimitationsofRatioAnalysis.	09

4	**Capital Budgeting:** Meaning and Importance of Capital Budgeting; Inputs for CapitalBudgeting Decisions; Investment Appraisal Criterion—Accounting Rate of Return,Payback Period, Discounted Payback Period, Net Present Value(NPV), ProfitabilityIndex, Internal Rate of Return (IRR), and Modified Internal Rate of Return (MIRR)**Working Capital Management:** Concepts of Meaning Working Capital; Importance ofWorking Capital Management; Factors Affecting an Entity's Working Capital Needs;EstimationofWorkingCapital Requirements;ManagementofInventories; ManagementofReceivables;andManagementofCashandMarketableSecurities.	10
5	**Sources of Finance:** Long Term Sources—Equity, Debt, and Hybrids; Mezzanine Finance;Sources of Short Term Finance—Trade Credit, Bank Finance, Commercial Paper; ProjectFinance. **Capital Structure:** Factors Affecting an Entity's Capital Structure; Overview of CapitalStructure Theories and Approaches— Net Income Approach, Net Operating IncomeApproach;TraditionalApproach,andModigliani-MillerApproach.Relationbetween CapitalStructureandCorporateValue;ConceptofOptimalCapitalStructure	05
06	**Dividend Policy:** Meaning and Importance of Dividend Policy; Factors Affecting anEntity'sDividendDecision;OverviewofDividendPolicyTheoriesandApproaches—Gordon'sApproach,Walter's Approach,andModigliani-Miller Approach	03

References:

1. FundamentalsofFinancialManagement,13th Edition(2015)byEugeneF.BrighamandJoelF.Houston;Publisher:CengagePublications, NewDelhi.
2. AnalysisforFinancialManagement,10th Edition(2013)byRobertC.Higgins;Publishers:McGrawHillEducation, NewDelhi.
3. IndianFinancialSystem,9th Edition(2015)byM.Y.Khan;Publisher:McGrawHillEducation,NewDelhi.
4. FinancialManagement,11th Edition(2015)byI.M.Pandey;Publisher:S.Chand(G/L)&CompanyLimited, NewDelhi.

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part (b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE2013	**Entrepreneurship Development andManagement**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE2013	**Entrepreneurship Developmentand Management**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1 To acquaintwithentrepreneurshipandmanagementofbusiness 2 UnderstandIndianenvironmentforentrepreneurship 3 Idea ofEDP,MSME
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Understandtheconceptofbusinessplanandownerships 2 Interpretkeyregulationsandlegalaspectsof entrepreneurshipinIndia 3 Understandgovernmentpoliciesforentrepreneurs

Module	**DetailedContents**	**Hours**
1	**Overview of Entrepreneurship:** Definitions, Roles and Functions/Values ofEntrepreneurship, History of Entrepreneurship Development, Role of Entrepreneurshipin the National Economy, Functions of an Entrepreneur, Entrepreneurship and Forms ofBusiness Ownership RoleofMoneyandCapitalMarketsinEntrepreneurial Development:Contributionof GovernmentAgenciesinSourcinginformationforEntrepreneurship	04
2	**Business Plans and Importance of Capital to Entrepreneurship:** Preliminary andMarketing Plans, Management and Personnel, Start-up Costs and Financing as well asProjected Financial Statements, Legal Section, Insurance, Suppliers and Risks,Assumptions and Conclusion, Capital and its Importance to the Entrepreneur**Entrepreneurship and Business Development:** Starting a New Business, Buying anExistingBusiness,NewProductDevelopment,BusinessGrowthandtheEntrepreneur LawanditsRelevancetoBusinessOperations	09
3	Women'sEntrepreneurshipDevelopment,Socialentrepreneurship-roleandneed,EDP cell,roleofsustainabilityandsustainabledevelopmentforSMEs,casestudies,exercises	05
4	**Indian Environment for Entrepreneurship:** key regulations and legal aspects, MSMEDAct 2006 and its implications, schemes and policies of the Ministry of MSME, role andresponsibilities of various government organisations, departments, banks etc., Role ofStategovernments interms ofinfrastructuredevelopmentsandsupportetc., Publicprivatepartnerships,NationalSkilldevelopmentMission,CreditGuaranteeFund, PMEGP,discussions,groupexercisesetc.	08
5	**Effective Management of Business:** Issues and problems faced by micro and smallenterprises and effective management of M and S enterprises (risk management, creditavailability,technology innovation,supplychainmanagement,linkagewithlarge industries),exercises,e-Marketing	08

6	**Achieving Success In The Small Business:** Stages of the small business life cycle, fourtypes of firm-level growth strategies, Options – harvesting or closing small businessCriticalSuccessfactors ofsmallbusiness	05

References:

1. PoornimaCharantimath,Entrepreneurshipdevelopment-SmallBusinessEnterprise,Pearson
2. EducationRobertDHisrich,MichaelPPeters,DeanAShapherd,Entrepreneurship,latestedition,The McGrawHill Company
3. DrTNChhabra,EntrepreneurshipDevelopment,SunIndiaPublications,NewDelhi
4. DrCNPrasad,SmallandMediumEnterprisesinGlobalPerspective,NewcenturyPublications,NewDelhi
5. VasantDesai,Entrepreneurialdevelopmentandmanagement,HimalayaPublishingHouse
6. MaddhurimaLall,ShikahSahai,Entrepreneurship,ExcelBooks
7. RashmiBansal,STAYhungry STAYfoolish,CIIE,IIMAhmedabad
8. LawandPracticerelatingtoMicro, SmallandMedium enterprises, TaxmannPublicationLtd.
9. Kurakto,Entrepreneurship-PrinciplesandPractices,ThomsonPublication
10. LaghuUdyogSamachar
11. www.msme.gov.in
12. www.dcmesme.gov.in
13. www.msmetraining.gov.in

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part(b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teachingscheme(ContactHours)		CreditsAssigned		
PEDIE2014	Human ResourceManagement	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE2014	HumanResource Management	20	20	20	80	3	--	--	100

CourseObjectives	1 Tointroducethe studentswithbasicconcepts,techniquesandpractices ofthehumanresourcemanagement 2 ToprovideopportunityoflearningHumanresourcemanagement(HRM)processes,relatedwiththefunctions, andchallengesintheemergingperspectiveof today'sorganizations 3 Tofamiliarizethestudentsaboutthe latestdevelopments,trends&differentaspectsofHRM 4 Toacquaintthestudentwiththeimportanceofinter-personal&inter-groupbehaviouralskillsinan organizationalsettingrequiredfor futurestableengineers, leaders andmanagers
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Understandtheconcepts,aspects,techniquesandpracticesofthehumanresourcemanagement. 2 UnderstandtheHumanresourcemanagement(HRM)processes,functions,changesandchallenges intoday's emergingorganizational perspective. 3 Gainknowledgeaboutthelatest developmentsandtrends inHRM. 4 Applythe knowledgeof behaviouralskillslearnt andintegrateit withininter personalandintergroupenvironment emergingas futurestableengineers andmanagers.

Module	Contents	Hours
1	**IntroductiontoHR** • HumanResourceManagement-Concept,ScopeandImportance,InterdisciplinaryApproachRelationshipwithotherSciences,CompetenciesofHRManager,HRMfunctions • Human resource development (HRD): changing role of HRM – Human resource Planning,Technologicalchange, Restructuringandrightsizing,Empowerment, TQM,Managing ethicalissues	05
2	**OrganizationalBehaviour(OB)** • Introduction to OB Origin, Nature and Scope of Organizational Behaviour, Relevance toOrganizationalEffectiveness andContemporary issues • Personality:MeaningandDeterminantsofPersonality,Personalitydevelopment,PersonalityTypes,AssessmentofPersonalityTraitsforIncreasingSelfAwareness • Perception:AttitudeandValue,EffectofperceptiononIndividualDecision-making,AttitudeandBehaviour • Motivation:TheoriesofMotivationandtheirApplicationsforBehaviouralChange(Maslow,Herzberg,McGregor); • Group Behaviour and Group Dynamics: Work groups formal and informal groups andstages of group development, Team Effectiveness: High performing teams, Team Roles,crossfunctionalandself-directedteam. Casestudy	07

3	**OrganizationalStructure&Design** • Structure,size,technology,Environmentoforganization;OrganizationalRoles&conflicts:Conceptofroles;roledynamics;role conflicts andstress. • Leadership:Conceptsandskillsofleadership,Leadershipandmanagerialroles,Leadershipstylesandcontemporary issues inleadership. • PowerandPolitics:Sourcesandusesofpower;Politicsatworkplace,Tacticsand strategies.	06
4	**HumanResourcePlanning** • RecruitmentandSelectionprocess,Job-enrichment,Empowerment–JobSatisfaction,employeemorale • PerformanceAppraisalSystems:Traditional&modernmethods,PerformanceCounselling,CareerPlanning Training&Development:IdentificationofTrainingNeeds, TrainingMethods	05
5	**EmergingTrendsinHR** • Organizational development; Business Process Re-engineering (BPR), BPR as a tool fororganizational development, managing processes & transformation in HR. OrganizationalChange, Culture,Environment • CrossCulturalLeadershipandDecisionMaking**:**CrossCulturalCommunicationanddiversityatwork**,**Causesofdiversity,managingdiversitywithspecialreferencetohandicapped, women and ageing people, intra company cultural difference in employeemotivation	06
6	**HR & MIS:** Need, purpose, objective and role of information system in HR, Applications inHRD in various industries (e.g. manufacturing R&D, Public Transport, Hospitals, Hotels andservice industries **Strategic HRM:** Role of Strategic HRM in the modern business world, Concept of Strategy,StrategicManagementProcess,ApproachestoStrategicDecisionMaking;StrategicIntent–CorporateMission, Vision,ObjectivesandGoals **Labor Laws & Industrial Relations:** Evolution of IR, IR issues in organizations, Overview ofLaborLawsinIndia;IndustrialDisputesAct,TradeUnionsAct,ShopsandEstablishmentsAct	10

References:

1. StephenRobbins,OrganizationalBehavior,16th Ed,2013
2. VSPRao,HumanResource Management,3rd Ed,2010,Excelpublishing
3. Aswathapa,Humanresourcemanagement:Text&cases,6th edition,2011
4. C.B.MamoriaandSVGankar,DynamicsofIndustrialRelationsinIndia,15th Ed,2015,HimalayaPublishing,15th edition,2015
5. P.SubbaRao,EssentialsofHumanResourcemanagementandIndustrialrelations,5th Ed,2013,HimalayaPublishing
6. LaurieMullins,Management& OrganizationalBehavior,2016,PearsonPublications

Assessment:

InternalAssessmentfor20marks: Consisting**TwoCompulsoryClassTests**

Firsttestbasedonapproximately40%ofcontentsandsecondtestbasedonremainingcontents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule 3,thenpart(b) will,befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDIE2015	Professional EthicsandCorporateSocial Responsibility(CSR)	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE2015	Professional EthicsandCorporate SocialResponsibility (CSR)	20	20	20	80	3	--	--	100

CourseObjectives	1 Tounderstandprofessionalethicsinbusiness 2 Torecognizedcorporatesocialresponsibility
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Understandrights andduties ofbusiness 2 Distinguishdifferentaspectsofcorporatesocialresponsibility 3 Demonstrateprofessionalethics 4 Understandlegalaspectsofcorporate socialresponsibility

Module	DetailedContents	Hours
1	**Professional Ethics and Business:** The Nature of Business Ethics; Ethical Issues inBusiness;MoralResponsibilityandBlame;Utilitarianism:WeighingSocialCostsandBenefits; RightsandDutiesof Business	04
2	**Professional Ethics in the Marketplace:** Perfect Competition; Monopoly Competition;OligopolisticCompetition;OligopoliesandPublic Policy **Professional Ethics and the Environment:** Dimensions of Pollution and ResourceDepletion;EthicsofPollutionControl;Ethicsof ConservingDepletableResources	08
3	**Professional Ethics of Consumer Protection:** Markets and Consumer Protection;ContractViewofBusinessFirm'sDutiestoConsumers;Due CareTheory;AdvertisingEthics;ConsumerPrivacy **ProfessionalEthicsofJobDiscrimination:** NatureofJobDiscrimination;Extentof Discrimination;ReservationofJobs.	06
4	**Introduction to Corporate Social Responsibility:** Potential Business Benefits—Triplebottom line, Human resources, Risk management, Supplier relations; Criticisms andconcerns—Natureofbusiness;Motives;Misdirection.TrajectoryofCorporateSocialResponsibilityin India	05
5	**CorporateSocialResponsibility:**ArticulationofGandhianTrusteeship Corporate Social Responsibility and Small and Medium Enterprises (SMEs) in India,CorporateSocialResponsibilityandPublic-PrivatePartnership(PPP)inIndia	08
6	**Corporate Social Responsibility in Globalizing India:** Corporate Social ResponsibilityVoluntary Guidelines, 2009 issued by the Ministry of Corporate Affairs, Government ofIndia,LegalAspectsof CorporateSocialResponsibility—Companies Act,2013.	08

References:

1. BusinessEthics:TextsandCasesfromtheIndianPerspective(2013)byAnandaDasGupta;Publisher:Springer.
2. CorporateSocialResponsibility:ReadingsandCasesinaGlobalContext(2007)byAndrewCrane,DirkMatten,Laura Spence;Publisher:Routledge.
3. BusinessEthics:ConceptsandCases,7thEdition(2011)byManuelG.Velasquez;Pearson,NewDelhi.
4. CorporateSocialResponsibilityinIndia(2015)byBidyutChakrabarty,Routledge,NewDelhi.

Assessment:

InternalAssessmentfor20marks:

Consisting**TwoCompulsoryClassTests**

Firsttestbasedonapproximately40%ofcontentsandsecondtestbasedonremainingcontents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part(b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDIE2016	ResearchMethodology	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE2016	Research Methodology	20	20	20	80	3	--	--	100

CourseObjectives	1 TounderstandResearchandResearchProcess 2 Toacquaintstudentswithidentifyingproblemsforresearchanddevelopresearchstrategies 3 Tofamiliarizestudentswiththetechniquesofdatacollection,analysisofdataandinterpretation
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Prepareapreliminaryresearchdesignforprojectsintheirsubjectmatterareas 2 Accuratelycollect,analyzeandreportdata 3 Presentcomplex dataorsituationsclearly 4 Reviewandanalyze researchfindings

Module	DetailedContents	Hours
01	**IntroductionandBasicResearchConcepts** **1.1** Research – Definition; Concept of Construct, Postulate, Proposition, Thesis,Hypothesis,Law,Principle.Research methodsvs Methodology **1.2** NeedofResearchinBusiness andSocialSciences **1.3** ObjectivesofResearch **1.4 Issues**andProblemsinResearch **1.5** CharacteristicsofResearch:Systematic,Valid,Verifiable,EmpiricalandCritical	09
02	**TypesofResearch** **2.1.** BasicResearch **2.2.** AppliedResearch **2.3.** DescriptiveResearch **2.4.** Analytical Research **2.5.** EmpiricalResearch **2.6**QualitativeandQuantitativeApproaches	07
03	**ResearchDesignandSampleDesign** **3.1** ResearchDesign–Meaning,TypesandSignificance **3.2** SampleDesign–MeaningandSignificanceEssentialsofagoodsamplingStages inSampleDesignSamplingmethods/techniquesSamplingErrors	07

04	**ResearchMethodology** **4.1** Meaning of Research Methodology **4.2**.Stages inScientificResearchProcess: **a.** IdentificationandSelectionofResearch Problem **b.** FormulationofResearchProblem **c.** ReviewofLiterature **d.** Formulationof Hypothesis **e.** FormulationofresearchDesign **f.** SampleDesign **g.** DataCollection **h.** DataAnalysis **i.** HypothesistestingandInterpretationofData **j.** Preparationof Research Report	08
05	**FormulatingResearchProblem** **5.1** Considerations: Relevance, Interest, Data Availability, Choice of data, Analysis ofdata, GeneralizationandInterpretationof analysis	04
06	**OutcomeofResearch** **6.1** Preparationof thereport onconclusionreached **6.2** ValidityTesting&EthicalIssues**6.3** SuggestionsandRecommendation	04

References:

1. Dawson,Catherine,2002,PracticalResearchMethods,NewDelhi,UBSPublishersDistributors.
2. Kothari,C.R.,1985,ResearchMethodology-MethodsandTechniques,New Delhi,WileyEasternLimited.
3. Kumar,Ranjit,2005,ResearchMethodology-AStep-by-StepGuideforBeginners,(2nded),Singapore,PearsonEducation

Assessment:

InternalAssessmentfor20marks:

Consisting**TwoCompulsoryClassTests**

Firsttestbasedonapproximately40%ofcontentsandsecondtestbasedonremainingcontents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelectureh oursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3thenpart(b) willbe fromany moduleotherthanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDIE2017	IPRandPatenting	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE2017	IPRandPatenting	20	20	20	80	3	--	--	100

CourseObjectives	1 Tounderstandintellectualpropertyrights protectionsystem 2 Topromote the knowledge ofIntellectual PropertyLaws of Indiaas well as Internationaltreatyprocedures 3 TogetacquaintancewithPatentsearchandpatentfilingprocedureandapplications
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 understandIntellectualPropertyassets 2 assistindividuals andorganizations incapacitybuilding 3 workfordevelopment,promotion,protection,compliance,andenforcementofIntellectualPropertyandPatenting

Module	DetailedContents	Hours
1	**Introduction to Intellectual Property Rights (IPR)**: Meaning of IPR, Different categoryof IPR instruments - Patents, Trademarks, Copyrights, Industrial Designs, Plant varietyprotection,Geographicalindications,Transferoftechnologyetc. **ImportanceofIPRinModernGlobalEconomicEnvironment:** TheoriesofIPR, PhilosophicalaspectsofIPR laws,NeedforIPR, IPRasaninstrumentofdevelopment	05
2	**Enforcement of Intellectual Property Rights:** Introduction, Magnitude of problem,Factors that create and sustain counterfeiting/piracy, International agreements,Internationalorganizations(e.g.WIPO,WTO)activeinIPRenforcement **IndianScenarioofIPR:** Introduction,HistoryofIPRinIndia,Overviewof IP lawsin India, Indian IPR, Administrative Machinery, Major international treaties signed byIndia,ProcedureforsubmittingpatentandEnforcementofIPRatnationalleveletc.	07
3	**EmergingIssuesinIPR:**ChallengesforIPindigitaleconomy,e-commerce, human genome, biodiversityandtraditionalknowledge etc.	05
4	**Basics of Patents:** Definition of Patents, Conditions of patentability, Patentable andnon-patentable inventions, Types of patent applications (e.g. Patent of addition etc.),Process Patent and Product Patent, Precautions while patenting, Patent specificationPatentclaims,Disclosuresandnon-disclosures,Patentrights andinfringement,Method ofgettinga patent	07
5	**PatentRules:**Indianpatentact,Europeanscenario,USscenario,Australiascenario, Japan scenario, Chinese scenario, Multilateral treaties where India is a member (TRIPSagreement,Parisconventionetc.)	08

6	**Procedure for Filing a Patent (National and International):** Legislation and SalientFeatures, Patent Search, Drafting and Filing Patent Applications, Processing of patent,Patent Litigation, Patent Publication, Time frame and cost, Patent Licensing, PatentInfringement **Patentdatabases:**Importantwebsites,Searchinginternationaldatabases	07

REFERENCEBOOKS:

1. RajkumarS.Adukia, 2007,AHandbook on Laws RelatingtoIntellectualProperty RightsinIndia,TheInstituteof Chartered Accountants ofIndia
2. KeaylaBK,Patentsystemandrelatedissuesataglance,PublishedbyNationalWorkingGrouponPatentLaws
3. TSengupta,2011,IntellectualPropertyLawinIndia,KluwerLawInternational
4. TzenWongandGrahamDutfield,2010,IntellectualPropertyandHumanDevelopment:CurrentTrendsandFuture Scenario, CambridgeUniversityPress
5. Cornish,WilliamRodolph&Llewelyn,David.2010,IntellectualProperty:Patents,Copyrights,TradeMarks andAlliedRight,7th Edition, Sweet &Maxwell
6. LousHarns,2012,Theenforcementof IntellectualPropertyRights:ACaseBook,3rd Edition, WIPO
7. PrabhuddhaGanguli,2012,IntellectualPropertyRights,1stEdition,TMH
8. RRadhaKrishnan& SBalasubramanian,2012,IntellectualPropertyRights,1st Edition,ExcelBooks
9. MAshokKumarandmohdIqbalAli,2-11,IntellectualPropertyRights,2ndEdition,SerialPublications
10. KompalBansalandPraishitBansal,2012,FundamentalsofIPRforEngineers,1stEdition,BSPublications
11. EntrepreneurshipDevelopmentandIPRUnit,BITSPilani,2007,AManualonIntellectualPropertyRights,
12. MathewYMaa,2009,FundamentalsofPatentingandLicensingforScientistsandEngineers,WorldScientificPublishingCompany
13. NSRathore,SMMathur,PritiMathur,AnshulRathi**,**IPR:Drafting,InterpretationofPatentSpecificationsandClaims**,**New India PublishingAgency
14. VivienIrish,2005,IntellectualPropertyRights forEngineers,IET
15. HowardBRockman,2004,IntellectualPropertyLaw forEngineersandscientists,Wiley-IEEEPress

<u>Assessment</u>:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightage of each module in end semester examination will be proportional to number ofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part (b)will befromanymoduleotherthanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDIE2018	**Digital BusinessManagement**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		3	**--**	**3**	**--**	**3**

Coursecode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration (inHrs)**			
		Test1	**Test2**	**Avg**					
PEDIE2018	**DigitalBusiness Management**	**20**	**20**	**20**	**80**	**3**	**--**	**--**	**100**

CourseObjectives	1 Tofamiliarizewithdigitalbusinessconcept 2 ToacquaintwithE-commerce 3 TogiveinsightsintoE-businessanditsstrategies
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Identifydriversofdigitalbusiness 2 Illustratevariousapproachesandtechniques forE-business andmanagement 3 PrepareE-businessplan

Module	Detailedcontent	Hours
1	**IntroductiontoDigitalBusiness-** Introduction, Background and current status, E-market places, structures, mechanisms,economicsandimpacts,Differencebetweenphysicaleconomyanddigitaleconomy. **Drivers of digital business**- Big Data & Analytics, Mobile, Cloud Computing, Social media,BYOD,andInternetofThings(digitallyintelligentmachines/services), Opportunities andChallenges inDigital Business	09
2	**OverviewofE-Commerce** **E-Commerce-** Meaning, Retailing in e-commerce-products and services, consumerbehavior,market researchandadvertisement B2B-E-commerce-selling and buying in private e-markets, public B2B exchanges andsupport services, e-supply chains, Collaborative Commerce, Intra business EC andCorporate portals Other E-C models and applications, innovative EC System-From E-government andlearningtoC2C,mobilecommerce andpervasivecomputing EC Strategy and Implementation-EC strategy and global EC, Economics and Justificationof EC, Using Affiliate marketing to promote your e-commerce business, Launching asuccessfulonline businessandEC project,Legal,Ethics and Societal impactsofEC	06
3	**Digital Business Support services**:ERP as e –business backbone, knowledge Tope Apps,Informationandreferralsystem **Application Development:** Building Digital business Applicationsandinfrastructure	06
4	**Managing E-Business**-Managing Knowledge,Management skills for e-business,managing Risks in e –business, Security Threats to e-business -Security Overview,Electronic Commerce Threats, Encryption, Cryptography, Public Key and Private KeyCryptography, Digital Signatures, Digital Certificates, Security Protocols over PublicNetworks:HTTP,SSL,FirewallasSecurityControl,PublicKeyInfrastructure(PKI)for Security,ProminentCryptographicApplications	06

5	**E-Business Strategy**-E-business Strategic formulation- Analysis of Company's Internaland external environment, Selection of strategy,E-business strategy into Action,challenges andE-Transition(ProcessofDigital Transformation)	04
6	**Materializinge-business:FromIdeatoRealization**-Businessplanpreparation**Case Studiesandpresentations**	08

References:

1. AtextbookonE-commerce**,**ErArunrajanMishra,DrWKSarwade,NehaPublishers&Distributors,2011
2. E-commerce fromvisiontofulfilment,EliasM.Awad,PHI-Restricted,2002
3. DigitalBusinessandE-CommerceManagement,6th Ed,DaveChaffey,Pearson,August 2014
4. IntroductiontoE-business-ManagementandStrategy,ColinCombe,ELSVIER,2006
5. DigitalBusinessConceptsandStrategy,EloiseCoupey,2nd Edition,Pearson
6. TrendandChallengesinDigitalBusinessInnovation,VinocenzoMorabito,Springer
7. DigitalBusinessDiscourseErikaDarics,April2015,PalgraveMacmillan
8. E-Governance-ChallengesandOpportunitiesin:Proceedingsin2nd InternationalConferencetheoryandpracticeofElectronic Governance
9. PerspectivestheDigitalEnterprise–AframeworkforTransformation,TCSconsultingjournalVol.5
10. Measuring Digital Economy-A new perspective- DoI:10.1787/9789264221796-enOECDPublishing

Assessment:

InternalAssessmentfor20marks:

Consisting**TwoCompulsoryClassTests**

First test based on approximately 40% of contents and second test based on remaining contents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:

Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelectureh oursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remainingquestionswillbemixedinnature**(forexampleifQ.2haspart(a)frommodule3then,part(b) will befromany moduleother thanmodule 3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-II						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDIE2019	Environmental Management	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		3	--	3	--	3

Coursecode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		InternalAssessment			End Sem. Exam	ExamDuration (inHrs)			
		Test1	Test2	Avg					
PEDIE2019	Environmental Management	20	20	20	80	3	--	--	100

CourseObjectives	1 Understandandidentifyenvironmentalissuesrelevantto Indiaandglobalconcerns 2 Learnconceptsof ecology 3 Familiariseenvironmentrelatedlegislations
CourseOutcomes	Uponsuccessfulcompletionofthiscourse,thelearnerwillbeableto: 1 Understandtheconceptofenvironmentalmanagement 2 Understandecosystemandinterdependence,foodchainetc. 3 Understandandinterpretenvironmentrelatedlegislations

Module	DetailedContents	Hours
1	Introduction and Definition of Environment: Significance of EnvironmentManagementforcontemporarymanagers,Careeropportunities,Environmental issuesrelevanttoIndia,SustainableDevelopment,theEnergyscenario	10
2	Global Environmental concerns : Global Warming, Acid Rain, Ozone Depletion,HazardousWastes,Endangeredlife-species,LossofBiodiversity,Industrial/Man-made disasters,Atomic/Biomedicalhazards,etc.	06
3	ConceptsofEcology:Ecosystemsandinterdependence betweenlivingorganisms, habitats,limitingfactors,carryingcapacity,foodchain,etc.	05
4	Scope of Environment Management, Role and functions of Government as a planningandregulatingagency EnvironmentQualityManagementandCorporateEnvironmentalResponsibility	10
5	TotalQualityEnvironmentalManagement,ISO-14000,EMScertification.	05
6	GeneraloverviewofmajorlegislationslikeEnvironment ProtectionAct,Air(P&CP) Act,Water(P& CP)Act,WildlifeProtectionAct,ForestAct,Factories Act,etc.	03

References:

1. Environmental Management: Principles and Practice, C J Barrow, Routledge Publishers London,1999
2. AHandbookofEnvironmentalManagementEditedbyJonC.LovettandDavidG.Ockwell,EdwardElgarPublishing
3. EnvironmentalManagement,**TVRamachandraandVijayKulkarni,TERIPress**
4. IndianStandardEnvironmentalManagementSystems—RequirementsWithGuidanceForUse,BureauOf IndianStandards, February2005

5. EnvironmentalManagement:AnIndianPerspective,SNCharyandVinodVyasulu,MaclillanIndia,2000
6. IntroductiontoEnvironmentalManagement,MaryKTheodoreandLouiseTheodore,CRCPressEnvironmentandEcology,MajidHussain,3rdEd.Access Publishing.2015

Assessment:

InternalAssessmentfor20marks:
Consisting**TwoCompulsoryClassTests**
Firsttestbasedonapproximately40%ofcontentsandsecondtestbasedonremainingcontents(approximately40%butexcludingcontentscovered inTestI)

EndSemesterExamination:
Weightageofeachmoduleinendsemesterexaminationwillbeproportionaltonumberofrespectivelecturehoursmentioned inthecurriculum.

1. Questionpaperwillcomprise oftotal**sixquestions**,**eachcarrying20marks**
2. **Question1**willbe**compulsory**andshould**covermaximumcontentsofthecurriculum**
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3thenpart(b) willbe fromany moduleother thanmodule3)
4. Only**Fourquestionsneedtobesolved**.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-III						
CourseCode	**CourseName**	**Teachingscheme (ContactHours)**		**CreditsAssigned**		
PEDMP301	**Major Project:Dissertation-I**	**Theory**	**Pract./Tut.**	**Theory**	**Pract./Tut.**	**Total**
		--	**20**	**--**	**10**	**10**

CourseCode	**CourseName**	**ExaminationScheme**							
		Theory					**Term Work**	**Pract/ Oral**	**Total**
		InternalAssessment			**End Sem. Exam**	**ExamDuration(in Hrs)**			
		Test1	**Test2**	**Avg**					
PEDMP301	**MajorProject: Dissertation-I**	--	--	--	--	--	**100**	**--**	**100**

GuidelinesforDissertation-I

Students should do literature survey and identify the problem for Dissertation and finalize in consultation withGuide/Supervisor.Studentsshouldusemultipleliteraturesandunderstandtheproblem.Studentsshouldattempt solution to the problem by analytical/simulation/experimental methods. The solution to be validatedwithproperjustificationandcompilethereportinstandardformat.GuidelinesforAssessmentofDissertation -I.

Dissertation-Ishouldbeassessedbasedonfollowingpoints

- QualityofLiterature surveyandNovelty intheproblem
- ClarityofProblemdefinitionandFeasibilityofproblemsolution
- Relevancetothespecialization
- Clarityofobjectiveandscope

Dissertation-I should be assessed through a presentation by a panel of Internal examiners and externalexaminerappointedbytheHeadoftheDepartment/InstituteofrespectiveProgramme.

M.E.ElectricalEngineering(PowerElectronicsandDrives)-Sem-IV						
CourseCode	CourseName	Teachingscheme (ContactHours)		CreditsAssigned		
PEDMP401	Major Project:Dissertation-II	Theory	Pract./Tut.	Theory	Pract./Tut.	Total
		--	32	--	16	16

CourseCode	CourseName	ExaminationScheme							
		Theory					Term Work	Oral	Total
		Internal Assessment			End Sem. Exam	ExamDuration(in Hrs)			
		Test1	Test2	Avg					
PEDMP401	MajorProject: Dissertation-II	--	--	--	--	--	100	100	200

GuidelinesforAssessmentofDissertationII

DissertationIIshouldbeassessedbasedonfollowingpoints:

- QualityofLiteraturesurveyandNovelty intheproblem
- ClarityofProblemdefinitionandFeasibilityofproblemsolution
- RelevancetothespecializationorcurrentResearch/ Industrialtrends
- Clarityofobjective andscope
- Qualityofwork attemptedorlearnercontribution
- Validationof results
- QualityofWrittenandOralPresentation

StudentsshouldpublishatleastonepaperbasedontheworkinreferredNational/Internationalconference/Journalofrepute.

DissertationIIshouldbeassessedbyinternalandExternalExaminersappointedbytheUniversityofMumbai.