Indira Gandhi University, Meerpur Rewari

Syllabus for M.Tech. – Final Year
(Semester III and IV)
(Electrical Engg.)

Session –w.e.f. 2020-2021

SCHEME OF STUDIESAND EXAMINATIONS FOR MASTER OF TECHNOLOGY IN ELECTRICAL ENGINEERING

SEMESTER-III

S.No.	Course Code	Course Title	Teaching schedule			Credits	Class Work	Examination		Total
			L	T	P			Theory	Practical	
1.	MTEE 301	ELECTIVE-I (DCEC)	3	1	0	4	50	100	-	150
2.	MTEE 302	ELECTIVE-II (DCEC)	3	1	0	4	50	100	-	150
3	MTEE 303	*Open Elective (OEC)	3	0	0	3				
4	MTEE 304	SEMINAR	0	0	0	1	--	-	-	25
5	MTEE 305	Self Study Paper				1	-			25
6	MTEE 306	DISSERTATION-PHASE I	0	0	4	4	150	-	-	150
			9	2	4	17				

***Note:To be Chosen from the pool of Open Electives provided by the University**

SCHEMEOFSTUDIESANDEXAMINATIONSFORMASTEROFTECHNOLOGYIN ELECTRICALENGINEERING

SEMESTER-IV

S.No.	Course Code	Course Title	Teaching Schedule			Credits	Class Work	Examination		Total
			L	T	P			Theory	Practical	
1	MTEE401	DISSERTATION FINAL PHASE	0	0	20	20	200	-	400	600
	TOTAL				20	20	200	-	400	600

NOTE:

1. Students have to publish a research paper in a UGC-CARE journal/International Conference of the research work done in the semester.
2. Students will have to submit a soft copy of their thesis with the hard copies.
3. Students have to submit a plagiarism report with the thesis report obtained from Turnitin software. This software is available in IGU Library. Upto 25% of similarity of matter is permitted.

SCHEMEOFSTUDIESANDEXAMINATIONSFORMASTEROFTECHNOLOGYIN ELECTRICALENGINEERING

LIST OF ELECTIVES

S.No.	Course Code	Course Title	Teaching Schedule			Class Work	Examination		Total
			L	T	P		THEORY	PRACTICAL	
ELECTIVE-I									
1	MTEE301A	ENERGY AUDIT IN POWER DISTRIBUTION SYSTEMS	3	1	0	50	100	-	150
2	MTEE301B	ELECTRICAL POWER QUALITY	3	1	0	50	100	-	150
3	MTEE301C	SMART GRID	3	1	0	50	100	-	150
ELECTIVE-II									
1	MTEE302A	POWER SYSTEM RELIABILITY	3	1	0	50	100	-	150
2	MTEE302B	POWER SYSTEM OPERATION AND CONTROL	3	1	0	50	100	-	150
3	MTEE302C	RESTRUCTURED ELECTRIC POWER SYSTEM	3	1	0	50	100	-	150

***Student has to take one subject out of subjects offered by department from this list.**

ENERGY AUDIT IN POWER DISTRIBUTION SYSTEMS (ELECTIVE-I)

MTEE301A **Sessional Marks:50**
L-T-P **Theory paperMarks:100**
3-1-0 **TotalMarks:150**
Exam. Duration: 3 Hrs.

NOTE: Examinerwillset9questionsintotal,withtwoquestionsfromeachsectionandone questioncoveringallsectionswhichwillbeQ.1.ThisQ.1iscompulsoryandofshortanswers type.Eachquestioncarriesequalmark(20marks).Studentshavetoattempt5questionsin totalatleastonequestionfromeachsection.

Learning Objectives

1. To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of energy conservation and energy auditing.
2. To enable the students to develop managerial skills to assess feasibility of alternative approaches and drive strategies regarding energy conservation and energy auditing.
3. Ability to understand various energy conservation methods useful in a particular industry.
4. Ability to Select appropriate energy conservation method for the critical area identified.

Section-A

Introduction to the power distribution system: Description of the power distribution system-voltagelevels,conductors&HVDS,Componentsofthedistributionsystem-Substation, Transformer, feeders, meters for measurement of energy & other electrical quantities, distribution system planning, operation & maintenance objectives, activities involvedinO&M,gridmanagement,loadscheduling&dispatch,loadbalancing,66-33/11 KV substation equipment, 11/0.4 KV substation equipment, distribution line equipment-overheadlines&undergroundcables,Distributiontransformers-reasonsforDTfailures, transformertesting.

Section -B

EnergyAccounting&EnergyAudit: Needforenergyaccounting,objectives&functionsof energy accounting, Energy flow diagram in power distribution system, energy accounting procedure-Energymeasurement,specialcases&cautionsinmeasurements,problemsin energy accounting & overcoming these problems in energy accounting, information technologyinterventionsforenergyaccounting,Definition,needandtypesofenergyaudit, energy audit instruments, Evaluating of energy conservation opportunities, procedure for conductinganenergyaudit,finalenergyauditreport.

Section -C

AT&CLossReduction&EfficiencyImprovement: Conceptsandprinciplesofdistribution lossestransmission&distributionlosses,AT&Clossesinpowerdistributionnetwork,factors contributingtohightechnical&commerciallosses.Technicallossreduction-Shortterm measures for technical loss reduction, long term plans for technical loss reduction, acceptabletechnicallosslevels,Commerciallossreduction-reasonsforcommerciallosses, measures for commercial loss reduction, legal measures, Metering & Billing system-Meteringtechnologies&techniques,meteringstandards,calibration&testingofenergy meters,revenueprotection&technologyinterventionsinmetering,billingandcollection.

Section-D

Demandsidemanagement: Anintroduction,WhyDSM?,BenefitsofDSM,DSMinpower systems:loadmanagement,DSMtechniquesandemergingtrends,ECAct2001,Electricity

regulatory commissions & DSM, DSM on consumer side – the industrial sector, the agriculturalsector,thedomestic&commercialsectors,ESCO-arouteforDSM,issuesin DSMimplementation.

TEXT BOOKS:

1. Handbook of Energy Engineering, The Fairmont Press, INC.-Albert Thumann &Paul Mehta.
2. Energy Management Supply & Conservation,Butterworth Heinemann,2002-dr.Clive Beggs.

REFERENCE BOOKS:

Hand book on energy audit & environment management by ISBN 81-1993.0920 TERI

Learning Outcomes

On completion of this course, the students will be able to exhibit

1. Conceptual knowledge of the technology, economics and regulation related issues associated with energy conservation and energy auditing.
2. Ability to analyze the viability of energy conservation projects.
3. Capability to integrate various options and assess the business and policy environment regarding energy conservation and energy auditing.
4. Advocacy of strategic and policy recommendations on energy conservation and energy auditing.

ELECTRICAL POWER QUALITY (ELECTIVE-I)

MTEE301B **Sessional Marks:50**
L-T-P **Theory paperMarks:100**
3-1-0 **TotalMarks:150**
Exam.Duration:3Hrs.

NOTE: Examinerwillset9questionsintotal,withtwoquestionsfromeachsectionandone questioncoveringallsectionswhichwillbeQ.1.ThisQ.1iscompulsoryandofshortanswers type.Eachquestioncarriesequalmark(20marks).Studentshavetoattempt5questionsin totalatleastonequestionfromeachsection.

Learning Objectives

1. Review definitions and standards of common power quality phenomena.
2. Understand power quality monitoring and classification techniques.
3. Investigate different power quality phenomena causes and effects.
4. Understand different techniques for power quality problems mitigation.

Section -A

IntroductiontoElectricalPowerQuality: PowerQuality,ConcerninPowerSystem,Power QualityIssues,StandardsofPowerQuality.

VoltageSagsandInterruptions: SourcesofSagsandInterruptions,FundamentalPrinciples of Protection, Solutions at End User Level, Comparison of Different Ride-Through Alternatives.

Section -B

Transient Overvoltages: Sources of Transient Overvoltages, Principles of Overvoltage Protection, Devices for Overvoltage Protection, Strategies for Utility SystemLightning Protection,SwitchingTransientProblemswithLoads.

Harmonics: Harmonics Distortion, Power System Quantities under Nonsinusoidal Conditions,HarmonicIndices,HarmonicsSourcesfromCommercialandIndustrialLoads, EffectsofHarmonicDistortiononPowerSystemEquipments.

Section - C

Wiring and Grounding: Reasons for Grounding, Typical Wiring and Grounding Problems, Solutions to wiring and Grounding Problems.

PowerQualityMonitoringandEvaluation: PowerQualityMonitoringanditsObjective, Power Quality Measurement Equipments, Power Quality Evaluation, Different Power QualityIndicesusedinPowerQualityEvaluation.

Section - D

Power Quality Conditioners: Passive Filters, Active Filters, Hybrid Filters, STATCOM, DSTATCOM, DVR, UPQC.

DistributedGenerationandPowerQuality: DistributedGenerationanditsAdvantagesand Disadvantages, Different Distributed Generation Technologies, Different Interfacing Electrical Systems,Power Quality Issues in Distributed Generation.

TEXTBOOKS:

1.ElectricPowerSystemsQuality:R.C.Dugan,M.F.McGranaghanandH.W.Beaty, McGraw-Hill.

REFERENCE BOOKS:

1. PowerSystemHarmonics:J.Arrillaga,D.A.BradelyandP.S.Bodger,Wiley.

2. ElectricPowerQuality:G.T.Heydt,StarsinaCircle.
3. EmbeddedGeneration:N.Jenkins,R.Allan,P.Crossley,D.KirschanandG.Strbac,IEEE Power and EnergySeries.
4. PowerQuality:C.Sankaran,CRCpress.
5. IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems,IEEEStd.519,1992.
6. IEEERecommendedPracticesonMonitoringElectricPowerQuality,IEEEStd.1159,1995.

Learning Outcomes

Students will be able to:

1. Use signal processing methods to identify power quality problems
2. Detect sources power quality problems
3. Propose solutions for power quality problems
4. Track regulations on power quality

SMART GRID (ELECTIVE – III)

MTEE301C
L-T-P
3-1-0

Sessional Marks:50
Theory paperMarks:100
TotalMarks:150
Exam. Duration: 3 Hrs.

NOTE: Examinerwillset9questionsintotal,withtwoquestionsfromeachsectionandone questioncoveringallsectionswhichwillbeQ.1.ThisQ.1iscompulsoryandofshortanswers type.Eachquestioncarriesequalmark(20marks).Studentshavetoattempt5questionsin totalatleastonequestionfromeachsection.

Learning Objectives

1. Present the fundamental concepts associated with Smart Grids.
2. Review renewable energy generation, grid integration energy storage technologies and future developments.
3. Introduce advanced management and control concepts of Smart Grids.
4. Construe the data management requirements and ICT technologies for Smart Grids.

Section - A

Introduction: Conceptofsmartgrid,smartgridcontrol,CommunicationsandSensingina SmartGrid,HardwareArchitecture,Softwarearchitecture,Protocoldetail,Discretecontrol andAnalogcontrol,application&benefits,PLCsVsRTUs,IED's,RTUBlockdiagram,PMU communication interface, Futuretrends.

Section - B

CyberSecurityoftheSmartGrid:SmartGridThreats,VulnerabilitiesandCyberSecurity Strategies,CyberSecurityEnvironment,FalseDataInjectionandAttacksinElectricPower Grids Cyber-Physical SystemSecurity.

Section - C

Smart Grid Technologies: Energy Management System, Demand side management: peak clipping, valley filling, load shifting etc. ,state estimation, load forecasting.

Section - D

DistributedGeneration&Control: Conceptofdistributiongeneration,introductionof variousdistributedgenerationsources,e.g.Wind,solar,fuel-cell,micro-hydro,PHEV'setc. Gridintegrationandcontrolofdistributedsources**.**

TEXT BOOKS:

1. T.Gönen,ElectricPowerDistributionSystemEngineering,McGraw-Hill,1986..
2. Distribution System Protection Manual, McGraw-Edison Power Systems, 1990.
3. WestinghouseElectricUtilityRef.Book,Vol.3,DistributionSystems,1965.
4. R.E.Brown,ElectricPowerDistributionReliability,MarcelDekkerInc.,2002.

REFERENCE BOOKS:

1. IEEEPowerandEnergyMagazine,July/August2007Issue
2. JamesBurke,PowerDistributionEngineering,MercelDekker,1994.ISBN:0-8247-9237-8.
3. A.J.Pansini,ElectricalDistributionEngineeringMcGrawHill,1983.

4. E.Lakervi,E.J.Holmes,ElectricityDistributionNetworkDesign,IEEseries,1989.
5. J.GersandE.J.HolmesProtectionofElectricityDistributionNetworks2ndEdition,

Learning outcomes

At the conclusion of the course students should be able to:

1. Identify the key elements of Smart Grids and visualise the roadmap towards next-Gen electricity networks.
2. Evaluate technology options pertaining to renewable energy generation, energy storage, data handling and communications for Smart Grids.
3. Justify technological and economical choices in the context of existing commercial Smart Grids projects and suggest improvements and expansions.
4. Determine the relevance of Smart Grids projects, develop ways to evaluate their impacts and implications
5. Analyze the new roles of utilities and consumers in Smart Grids and pinpoint business and market opportunitiesand potential gains.

POWER SYSTEM RELIABILITY (ELECTIVE - II)

MTEE302A
L-T-P
3-1-0

Sessional Marks:50
Theory paperMarks:100
TotalMarks:150
Exam. Duration: 3 Hrs.

NOTE: Examinerwillset9questionsintotal,withtwoquestionsfromeachsectionandone questioncoveringallsectionswhichwillbeQ.1.ThisQ.1iscompulsoryandofshortanswers type.Eachquestioncarriesequalmark(20marks).Studentshavetoattempt5questionsin totalatleastonequestionfromeachsection.

Learning objectives

1. Use the language of power system reliability analysis
2. Develop analytical models for power system reliability analysis.
3. Implement and use algorithms for power system reliability analysis.
4. To predict system performance

Section - A

Introduction: Definition of reliability, types of failures, definition and factorsinfluencing systemeffectiveness,variousparametersofsystemeffectiveness,lawsofprobability, conditionalprobability,Bay'stheorem;variousdistributions;datacollection,recoveryof data,dataanalysisProcedures,empiricalreliabilitycalculations.

Section - B

ReliabilityMathematics:Typesofsystem-series,parallel,seriesparallel,standbyand complex;developmentoflogicdiagram,methodsofreliabilityevaluation;cutsetandtie-set methods,matrixmethodseventtreesandfaulttreesmethods,reliabilityevaluationusing probabilitydistributions,Markovmethod,frequencyanddurationmethod.

Section - C

ReliabilityofGenerationandtransmissionSystem:Generatingsystemmodel,LossofLoad, LossofEnergy,Scheduledoutage,Loadforecastuncertainty,Transmissionsystemmodel, Network configurations, state selection, System and load point indices, Numerical evaluation,Applicationtopracticalinterconnectedtransmissionsystem.

Section - D

Reliability of Distribution System: Reliability evaluation of distribution system, various interruption indices: customer-oriented indices, Load and energy oriented indices, system performance, system prediction, Application to radial distribution system, Effects of disconnects, Effect of protection failures, Effects of transferring loads.

Text Books:

1. R.Billintan&R.N.Allan,"ReliabilityEvaluationofEngineeringandSystems",PlenumPress.
2. S.K.Sinha&B.K.Kale,"LifeTestingandReliabilityEstimation",WielyEasternLtd.

Reference Books:

1. K.C.Kapoor&L.R.Lamberson,"ReliabilityinEngineeringandDesign",JohnWielyand Sons.
2. M.L.Shooman,"ProbabilisticReliability,AnEngineeringApproach",McGrawHill.
3. L.S.Srinath,ReliabilityEngineering,AffiliatedEast-WestPress,NewDelhi.

4. A.K.Govil,ReliabilityEngineering,TataMc-GrawHill,NewDelhi

Learning Outcomes

1. Understand the importance of maintaining reliability of power system components
2. Apply the probabilistic methods for evaluating the reliability of generation and transmission systems.
3. Assess the different models of system components in reliability studies.
4. Assess the reliability of single area and multi area systems.

POWER SYSTEM OPERATION AND CONTROL (ELECTIVE –II)

MTEE302B
L-T-P
3-1-0

Sessional Marks:50
Theory paperMarks:100
TotalMarks:150
Exam. Duration: 3 Hrs.

NOTE: Examinerwillset9questionsintotal,withtwoquestionsfromeachsectionandone questioncoveringallsectionswhichwillbeQ.1.ThisQ.1iscompulsoryandofshortanswers type.Eachquestioncarriesequalmark(20marks).Studentshavetoattempt5questionsin totalatleastonequestionfromeachsection.

Learning Objectives

1. To study UCP usin forward and backward approach.
2. To provide students the knowledge of optimization techniques used in the power system andLoad Frequency Control (LFC).
3. To study LF control
4. To know about the energy supply and fuel scheduling.

Section - A

Unit commitment problem : Introductions to UCP, thermal & Hydral constraints in Unit commitment
:Prioritylistschememethod,unitcommitmentproblemsolutionbyprioritylistschememetho d,
UnitcommitmentproblemsolutionsbyDynamicprogrammingApproach.Introduction,advanta ges
ofDPmethodoverprioritylistscheme,BackwordDPapproach,forwardDPapproachalgorithma nd theirflowchartssolutionUCPusingDynamicprogrammethod.

Section - B

LoadFrequencyControl-I:NecessityofkeepingfrequencyconstantDefinitionofcontrol area,singleareacontrol,BlockdiagramrepresentationofanisolatedPowerSystem,Steady Stateanalysis,Dynamicresponse-Uncontrolledcase.
LoadFrequencyControl-II:Loadfrequencycontrolof2-areasystem:uncontrolledcaseand controlledcase,tie-timebiascontrol

Section - C

ProportionalplusIntegralcontrolofsingleareaanditsblockdiagramrepresentation, steadystateresponse,loadfrequencycontrolandEconomicdispatchcontrol.OptimalLF control-steadystaterepresentation,performanceIndexandoptimalparameteradjustment.

Section - D

Generation with limited Energy supply : Take-or-pay fuel supply contract, composite generationproductioncostfunction.Solutionbygradientsearchtechniques,Hardlimitsand slackvariables,Fuelschedulingbylinearprogramming.
Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation,InterchangeEvaluationwithunitcommitment,MultipleInterchangecontracts.

REFERENCE BOOKS

1. ElectricalEnergySystemsTheory-byO.I.Elgerd,TataMcGraw-HillPublishingCompany Ltd, 2ndedition.
2. PowerSystemAnalysisbyHadiSaadat–TataMcGrawHillPublications
3. PowerGeneration,OperationandControl-byA.J.WoodandB.F.Wollenberg,Johnwiley & sonsInc.19844.ModernPowerSystemAnalysis-byI.J.Nagrath&D.P.Kothari,TataMcGraw-HillPublishingCompanyltd,2ndedition.

Learning outcomes

On completion of this Subject/Course the student shall be able to:

1. To provide students the knowledge of optimization techniques used in the power system and Load Frequency Control (LFC).
2. To express variation of frequency in the power system with varying load.
3. To improve the ability in solving problems (numerical problems at present) by posing different problem models related to Economic Load Dispatch, Load Frequency Control and reactive power control.
4. An understanding of operational constraints (equipment and stability), control objectives and their implementation, under normal and abnormal states of a power system

RESTRUCTURED ELECTRIC POWER SYSTEM (ELECTIVE - II)

MTEE302C
L-T-P
3-1-0

Sessional Marks:50
Theory paperMarks:100
TotalMarks:150
Exam. Duration: 3 Hrs.

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NOTE: Examinerwillset9questionsintotal,withtwoquestionsfromeachsectionandone questioncoveringallsectionswhichwillbeQ.1.ThisQ.1iscompulsoryandofshortanswers type.Eachquestioncarriesequalmark(20marks).Studentshavetoattempt5questionsin totalatleastonequestionfromeachsection.

Learning objectives

1. To study the models for restructuring of power systems.
2. To understand the concept of ATC and factors affecting it.
3. To know about the congestion in Power Market.
4. To study the services of power market.

Section - A

Fundamentals of Deregulation: Privatization and Deregulation, Motivations for Restructuring the Power Industry, Power System Restructuring Models and Trading Arrangements: Models based on energy trading, Models based on contracting arrangements,RoleofISO:Functions&Responsibilities,ISOModels,Bidding&Auction Mechanisms.

Section - B

TransmissionOpenAccess: DeregulationinAsiaincludingIndia,ForwardandFuture market,OperationandControl:Oldv/sNew,ElectricityAct2003anditsimpactonESIin India,ConceptofATC,itsprinciplesandfactorsaffectingATC,DeterminationofATC.Market Poweranditseffects,Typesofmarketpower,Causesofmarketpower,Analysisofmarket power,andIntegrationofmarketpower.

Section - C

Transmission Pricing and Congestion management: Power trading, Transmission pricing in OpenaccessSystems:Rolled-inPricingMethods,Incremental(Marginal)PricingMethods, EmbeddedCostRecovery,CongestionManagementinDeregulatedPowerMarket,andits ImpactonMarginalPrice,InterandIntraZonalcongestionmanagement.

Section - D

Ancillary Services in Restructured Power Market: Wheeling charges, Wheeling methodologies,AncillaryServicesanditstypessuchasVoltagesupport,Energyimbalance services, Operating resource services, Black Start Capability services, Scheduling and dispatchservices.

TEXT BOOKS:

1. LeiLeeLal,*PowerSystemRestructuringandDeregulation*.UK:JohnWileyandSons,2001.
2. KankarBhattacharya,MathH.J.BollenandJaapE.Daalder,*OperationofRestructured Power*
Systems. USA: Kluwer Academic Publishers, 2001.
3. Md.ShahidehpourandMuwaffaqAlomoush,*RestructuredElectricalPowerSystems.*

Marcel
Dekker, Inc.
4. OverviewofPowerSectorinIndia2005:IndianCorePublishing.
5. PowerSystemsEngineeringbyS.K.Gupta,UmeshPublication.

Learning Outcomes:

At the end of the course, the student will be able to:

1. Understand the need for restructuring of Power Systems, discuss different market models, different stakeholders and market power
2. Understand and generalize the functioning and planning activities of ISO.
3. Understand transmission open access pricing issues and congestion management.
4. Define transfer capability and estimate the transfer capability of a small power systems.

SEMINAR

MTEE303 **Sessional Marks:50**
L-T-P **Theory paperMarks:50**
3-1-0 **TotalMarks:100**

Learning Objectives

1. Distinguish and integrate differing forms of knowledge and academic disciplinary approaches.
2. Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
3. Apply principles of ethics and respect in interaction with others.
4. Help the student increase self-motivation, personal responsibility, and understanding of his or her role in being an informed participant in the educational process.

Seminarshallbebasedontentativetopicondissertationsuchasreviewpaperonsome specificwelldefinedarea/specializedstreamofelectricalengineering.Eachstudenthasto prepareawriteupofabout25pagesof“A4”sizesheetsandsubmititinduplicateasthe termwork.

Thestudenthastodeliveraseminartalkin-frontoffacultymembersofthedepartmentand hisclassmates.Thefacultymembers,basedonthequalityoftheworkandpreparationand understandingofthecandidate,shalldoanassessmentoftheseminarinternally-jointly. Somemarksshouldbereservedfortheattendanceofthestudentintheseminarsofthe othersstudents.

Learning Outcomes

1. To study research papers for understanding of a new field, in the absence of a textbook , to summarize and review them.
2. To impart skills in preparing detailed report describing the project and results.
3. Identify and understand assumptions, theses, and arguments that exist in the work of authors.
4. Evaluate and synthesize evidence in order to draw conclusions consistent with the text. Seek and identify confirming and opposing evidence relevant to original and existing theses.
5. Ask meaningful questions and originate plausible theses.
6. Critique and question the authority of texts, and explore the implications of those texts.

DISSERTATION - PHASE I

MTEE304 **Sessional Marks:50**
L-T-P **P/VivaMarks:100**
0-0-4 **TotalMarks:150**

LEARNING OBJECTIVES:

1. To develop and test one's ability to learn independently.
2. To apply the concepts and theories learnt in previous years of study and work placements.
3. To test one's ability to complete a substantial piece of work to a laid-down standard and within a given time period.
4. To Identify a topic and developing a research question or set of questions within an academically sound framework connected to specialization.
5. To investigate the chosen topic in depth. This implies collecting and reviewing literature (e.g. books, papers, journals, websites, proceedings etc.) and understanding and interpreting the most up-to-date concepts and theories of your chosen academic field and/or thesis topic.

The term work under this, submitted by the student shall include-

1. Work diary maintained by the student and counter signed by his guide.
2. Thecontentsofworkdiaryshallreflecttheeffortstakenbycandidatefor
(a) Searchingthesuitableprojectwork
(b) Visittodifferentfactoriesororganizations
(c) Briefreportofjournalsandvariouspapersreferred
(d) Briefreportofwebsitesseenforprojectwork
(e) Thebriefoffeasibilitystudiescarriedtocometofinalconclusion
(f) Roughsketches
(g) Designcalculationetc.carriedbythestudent

Thestudenthastomakeapresentationinfrontofexpertsinadditiontoguideasdecided by departmenthead.

Learning Outcomes

On successful completion of the course, the student will:

1. At the end of the course the student's gets exposure to construct and justify research questions related to the topic.
2. Each student will be in a position to design a research investigation that incorporates appropriate theoretical approaches, conceptual models, and a review of the existing literature.
3. Students will learn to structure a discussion in a coherent and convincing way by synthesizing the material in the context of the research questions.
4. Students will be having sufficient collection of the literature/experimental data for the experimentation in Dissertation Phase-II.

DISSERTATION- FINAL PHASE

MTEE401 **Sessional Marks:200**
L-T-P **P/VivaMarks:400**
0-0-20 **TotalMarks:600**

Learning Objectives

1. To provide a capacity to learn continually and interact with multidisciplinary groups.
2. To provide innovative methods and techniques to solve research problem.
3. To interpret the research material of dissertation phase – I in a critical manner and to proceed with an analysis/simulation/experimentation and critical review.
4. To discover and provide a framework within which research is conducted so that student's answers are fact based and backed-up by solid information.
5. To craft an extensive and comprehensive piece of written work so as to convey research in the most efficient and effective way and therefore confirm to the reader that the thesis is, as a minimum, of a worthy standard and quality.

The dissertation submitted by the student on topic already approved by university authorities on thebasisofinitialsynopsissubmittedbythecandidateshallbeaccordingto following guidelines Format of dissertation report.
ThedissertationworkreportshallbetypedwithdoublespaceonA4bondpaper.Thetotal numberofpagesnotmorethan150andnotlessthan60.Figures,graphs,annexureetc.be addedasperrequirement.Thereportshouldbewritteninthefollowingformat:

1. Title sheet
2. Certificate
3. Acknowledgement
4. List of figures/photographs/graphs/tables
5. Abbreviations
6. Abstract/ final synopsis
7. Contents
8. Text with usual scheme of chapters
9. Discussion of the results and conclusion
10. Bibliography(The source of illustrative matter should be acknowledge clearly at appropriate place.

Learning Outcomes

On successful completion of the course, the student will:

1. At the end of the course the student's gets exposure to design a research investigation that incorporates appropriate theoretical approaches, conceptual models, and a review of the existing literature.
2. Students will learn to structure a discussion in a coherent and convincing way by summarizing the key arguments and providing suitable and coherent findings.
3. Student will be able to draw valid conclusions, relating them to the research topic.
4. Students will write a comprehensive review of the literature, including a review of other dissertation research related to their study.