SCHEME OF COURSE WORK

CourseDetails:

CourseTitle	**:Distribution Automation**		
CourseCode	**:13EE2105**	**L T P C**	**:4 1 0 3**
Program:	**:M.Tech.**		
Specialization:	**:PowerSystemand ControlAutomation**		
Semester	**:First**		
Prerequisites	**: Knowledge ofelectricaldistributionsystemsis desirable.**		
Coursestowhich itis a prerequisite	--		

CourseOutcomes (COs):

1	Describe the necessity of Distribution Automation, DAS Hardware and DAS Software.
2	Outline DA Capabilities and Management Processes supported by DA.
3	Distinguish between different Communication Systems used in DA
4	Discuss the Technical Benefits of DA and EconomicEvaluation, of DA on Distribution System.
5	Explain the Procedure & Methods available for Economic Evaluation DA Alternate Plans.

ProgramOutcomes(POs):

AgraduateofM.Tech(Power System Automation and Control)willbeableto

1	Acquirein-depth knowledge in theareaof powersystem controlandautomation.
2	Attain the abilityto think criticallyand analyzecomplexengineeringproblems related to power system control and automation
3	Obtain the capabilityof problem solvingand original thinkingto arrive at feasible and optimal solutions consideringsocietal andenvironmental factors
4	Extract information throughliteraturesurveyand applyappropriate researchmethodologies, techniques and tools to solve powersystem problems.
5	Usethe state-of-the-art tools formodeling, simulation and analysis of problems related to power systems
6	Attain the capabilitytocontributepositivelyto collaborative and multidisciplinaryresearchtoachieve common goals
7	Demonstrate knowledgeand understandingof power system engineeringand management principles and applythe sameforefficientlycarryingout projects with due consideration to economical and financial factors.
8	Communicate confidently, make effectivepresentations and writegood reportsto engineering communityand society
9	Recognizethe need for life-longlearning and havethe abilityto do it independently
10	Becomesociallyresponsibleand follow ethical practicesto contributeto thecommunityforsustainable development of society.
11	Independentlyobserveand examine criticallytheoutcomes of his actions and reflect on to make correctivemeasures subsequentlyand move forward positivelybylearningthrough mistakes

CourseOutcomeVersus**ProgramOutcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	M	M			M	M				
CO-2	S	M	M			M					
CO-3	S	M	M			M					
CO-4	S	M	M			M	S				

S -Stronglycorrelated,*M- Moderately*correlated,*Blank-No correlation*

Assessment Methods:	Assignment/Quiz/Seminar /CaseStudy/Mid-Test/EndExam

Teaching-Learningand Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample Questions	TEACHING-LEARNING STRATEGY	Assessment Method& Schedule
1	Introduction to Distribution Automation (DA), Distribution Automation and the UtilitySystem,ControlSystems Interfaces,	CO1	Definethefollowingterms andbrieflyexplain. (i)Distribution AutomationSystem (ii) UtilitySystem	▫Lecture ▫Interactive Discussion	
2	Control and Data Requirements Centralized(Vs)Decentralized control,DA System(DAS),	CO1	CompareCentralizedand DecentralizedControlof DistributionAutomation	▫Lecture ▫Interactive Discussion	Assignment (Week 2-4)
3	DA HardwareDAS Software,	CO1	DiscussDA Hardware and DAS Software.	▫Lecture Interactive Discussion	Assignment (Week 2-4)
4	Distribution Automation Functions:, DA CapabilitiesAutomation System Computer facilities,	CO2	WhatareDACapabilities? BrieflyExplainwithexample Drawtheflowchartforthe followingto illustratetherol of computerinmanagingthe DAprocess. (i)FaultIdentificationand SystemRestoration (ii)ComputerVolt/Var Control	▫Lecture ▫Interactive Discussion	Assignment (Week 2-4)
5	ManagementProcess, Information Management,System Reliability Management,System Efficient Management, Voltage Management,Load Management	CO2	Explainthefollowing managementprocesses supportedbyDA (i) SystemReliability Management (ii)SystemEfficiency Management	▫Lecture Interactive Discussion	Assignment (Week 5-7)
6	Communication System for DA: DA Communication Requirements, Communication Reliability, Cost Effectiveness, Data Rate Requirements, TwowayCapabilityAbility toCommunicate during outages and faults, Ease of operation and maintenance Confirming Architecture ofDataFlow	CO3	Whatarethedesirable characteristicsof communicationsystems requiredforDistribution Automation?Explainthem.	▫Lecture ▫Interactive Discussion	Assignment (Week 5-7)

7	CommunicationSystemsused inDA: Distribution LineCarrier (Power Line Carrier, Ripple Control,Zero Crossing Technique,Telephone,CableTV,	CO3	Listoutthevarious communicationtechniques usedforDA.Describe themwithrelevant diagrams.	▫Lecture Interactive Discussion	Assignment (Week 5-7)
8	Radio : AM Broadcast, FMSCA, VHF, Microwave,Satellite,Fiber Optics, Hybrid Communication Systems, Communication Systemsusedin fieldtests	CO3	Whatis Hybrid CommunicationSystem? Brieflyexplainwithdiagram	▫Lecture ▫Interactive Discussion	Assignment (Week 5-7)
9	Technical Benefits: DA Benefits Categories, Capital Deferred Savings Operation and maintenance Savings ,Interruption Related Savings,Customer Related Savings,OperationalSavings, Improvedoperation,	CO4	Whatarepotentialbenefit categoriesofDistribution Automation?Discussthem withbenefitexamples.	▫Lecture Interactive Discussion	TEST-I
10	Function Benefits, Potential Benefits for Functions FunctionSharedBenefits,	CO4	Discusspotentialbenefits andfunctionshared benefits?	▫Lecture ▫Interactive Discussion	
11	Guidelines for formulation of estimation equations,	CO4	Discusstheguidelinesfor formulationof estimation equations?	▫Lecture Interactive Discussion	Assignment (Week 11-13)
12	Parameters required,Economicimpact areas,Integrationof benefitsintoeconomic Evaluation,Resourcesfor determine benefits,	CO5	BrieflydiscussEconomic impactareasofdistribution automation	▫Lecture ▫Interactive Discussion	Assignment (Week 11-13)
13	Impacton distributionSystem,	CO5	Describetheimpactof distributionautomationon distributionsystem	▫Lecture Interactive Discussion	Assignment (Week 11-13)
14	Economic Evaluation Methods, Development and Evaluation of AlternativesPlans,Select Study Area, SelectStudyPeriod,ProjectLoadGrowth ,Develop alternatives, Calculate and Operating and Maintenance Costs, EvaluateAlternatives	CO5	Explain,indetail,the procedurefordevelopment andevaluationof alternate distributionplanstomeet thedistribution requirementsofaparticular geographicarea.	▫Lecture ▫Interactive Discussion	
15	EconomicComparisonofAlternatePlans, ClassificationofExpenses andcapital expenditures,Comparison ofrevenue requirements of alternatives plans ,Book lifeandcontinuingplantanalysis	CO5	Distinguish between Expenses and CapitalExpenditurewith examples.	▫Lecture Interactive Discussion	
16	Yearby Yearrevenue requirement analysis,Short termAnalysis,End of Study Adjustments,Break evenAnalysis,	CO5	Whataretheaccepted approaches/methodsfor comparisonofrevenue requirementsof distributionalternateplans. Explainanytwoof them.	▫Lecture ▫Interactive Discussion	
17	Sensitivityanalysis,Computationalaids	CO5	Whatdo you understand by Sensitivity Analysis in economic evaluation of DA Alternate Plans.	▫Lecture Interactive Discussion	
18	Major steps in utility economic evaluation of Distribution Automation	CO5	Drawablockdiagram clearlyshowingmajorsteps inUtilityEconomic Evaluationof Distribution Automation	▫Lecture Interactive Discussion	Test-II
19/20	**END EXAM**				