DEPARTMENT OF EEE
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	Power system operation and control		
Course Code		**No. of Credits**	
Course Code of Pre-requisite subject(s)			
Session	Jan. 2018	**Section (if, applicable)**	-
Name of Faculty	S Arul Daniel	**Department**	EEE
Email	daniel@nitt.edu	**Telephone No.**	0431-2503256
Course Type	■ Core course	☐ Elective course	

Syllabus (approved in BoS)

Economic operation - Load forecasting - Unit commitment – Economic dispatch problem of thermal units – Gradient method- Newton's method – Base point and participation factor method. Hydro-thermal co-ordination - Hydroelectric plant models – Short term hydrothermal scheduling problem - Gradient approach – Hydro units in series - pumped storage hydro plants - Hydro-scheduling using Dynamic programming and linear programming. Automatic generation control - Review of LFC and Economic Dispatch control (EDC) using the three modes of control viz. Flat frequency – Tie-line control and tie-line bias control – AGC implementation – AGC features - Static and dynamic response of controlled two area system. MVAR control - Application of voltage regulator – Synchronous condenser – Transformer taps – Static VAR compensators. Power system security - Contingency analysis – Linear sensitivity factors – AC power flow methods – contingency selection – Concentric relaxation – Bounding-security constrained optimal power flow - Interior point algorithm - Bus incremental costs.

COURSE OBJECTIVES

1. To understand the economic operation of a power system with thermal and hydro units.
2. To realize the requirements and the methods employed for real and reactive power control in a power system.
3. To be familiar with secure operation of power system and contingency studies.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. Develop generation dispatching schemes for thermal and hydro units	1, 4
2. Apply control and compensation schemes on a power system.	5
3. Carry out contingency analysis to improve the security of the power system	2

COURSE OVERVIEW

Power systems had expanded geographically to a large proportion and areas are getting inter-connected to form large power pools. This course aims to give a handle for graduate students to learn the state-of-the art techniques in operating the power system economically by (a)scheduling the generation of the power plants, (b) energy interchange between areas (c) reactive power support (d) security control.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Weeks 1 to 3	Introduction to economic operation, Economic dispatch, various techniques.	Lectures and Simulation Exercises
2	Week 4 to 6	Hydro thermal scheduling	Lectures and Simulation Exercises
3	Weeks 7 and 9	Generation Control, Governor models, droop characteristics	Lectures and Simulation Exercises
4	Weeks 9 and 11	Reactive Power Compensation and Control	Lectures and Simulation Exercises
5	Weeks 11 and 13	Secure System Operation	Lectures, videos and Simulation Exercises

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Summative Assessment I	End of 6th week	1 hour	20%
2	Summative Assessment II	End of 11th week	1 hour	20%
3	Group Project	Submission end of 13th week		20%
4	Seminar Talk on Project work	14th week		10%
CPA	Compensation Assessment*	14th week	1 hour	
5	Final Assessment	16th week	2 hours	30%

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

As decided by the Academic Section.

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, , academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc)

In person during office hours. However, can contact over phone under exigencies.

ATTENDANCE Students with less than 75% attendance shall be prevented from appearing the final assessment and shall be awarded V grade.
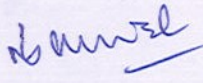
COMPENSATION ASSESSMENT

Compensation Assessment is applicable only to those who have obtained prior permission due to prolonged illness.

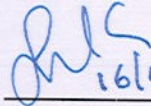**ACADEMIC HONESTY & PLAGIARISM**

Copying in examination will result in V or F grade if it is final assessment. If found copying in other summative assessments the student will be given no marks for the assessment and no compensation assessment will be permitted.

ADDITIONAL INFORMATION

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** _____ HOD ____16/01/2018___