

DEPARTMENT OF PRODUCTION ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	ELECTRICAL AND CONTROL SYSTEMS		
Course Code	PRPC19	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEIR11		
Session	July/ Jan. 2018	Section (if, applicable)	A / B
Name of Faculty	Ms.S.MALARVILI	Department	EEE
Email	--	Telephone No.	--
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
DC machines - Characteristics - Starting and speed control of DC motors. Transformers: (Single phase only)- equivalent circuit and regulation - losses and efficiency - auto transformer. Alternators - EMF equation - regulation by synchronous impedance method - Synchronous motors starting and applications. Three - phase induction motor - Cage and slip ring motors -torque slip characteristics –starting and speed control of induction motors - single phase induction motors and universal motors. Electric drive for general factory, textile mill - pump, blowers, hoists, traction etc. - group and individual drives - Construction and working of dynamometer type watt meters and induction type energy meters. Control System – open loop and closed loop systems- transfer function - time response of second order system - frequency response method - polar plot. Concept of stability - application of routh criterion for simple systems			
COURSE OBJECTIVES			
This course is designed to apply concepts of electrical drives and control systems to various industrial applications and to test various electrical equipments.			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
1. To understand the concepts of transformers and DC machines	PO ₁ , PO ₆ , PO ₇ – PO ₁₂		
2. To understand open loop and closed loop system	PO ₁ , PO ₆ , PO ₇ – PO ₁₂		
3. To conduct exercises for learning DC motors	PO ₁ , PO ₆ , PO ₇ – PO ₁₂		

COURSE PLAN – PART II

COURSE OVERVIEW

This course examines the basic theory, characteristics, construction operation and application of rotating electrical machines. It includes the study of direct current motors, direct current generators, alternators, synchronous motors, polyphase induction motors and single phase motors. This course provides an introduction to linear systems, transfer functions, and Laplace transforms. It covers stability and feedback, and provides basic design tools for specifications of transient response. It also briefly covers frequency-domain techniques.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	II week of January (8 th – 12 th) 3 hrs	Introduction to the course, DC machines- Characteristics – Starting and speed control of DC motors	Lecture(Chalk&board / Power point presentation) Lab(Practical experimentation)
2	III week of January (15 th – 19 th) 3 hrs	Transformers: (Single phase only)- equivalent circuit and regulation	
3	IV week of January (22 nd & 23 rd) 2 hrs	Transformer: losses and efficiency - auto transformer	
4	V week of January (29 th & 30 th) & 2 nd February 3 hrs	Laboratory session 1. No - load speed characteristics of D.C. shunt motor 2. Load test on D.C.Shunt generator 3. Equivalent circuit of single - phase transformer	
5	II week of February (5 th – 9 th) 3 hrs	Alternators - EMF equation - regulation by synchronous impedance method	
6	III week of February (12 th – 16 th) 3 hrs	Synchronous motors starting and applications, Three - phase induction motor - Cage and slip ring motors	
7	19 th February	Assessment 1	
8	IV week of February (20 th & 23 rd) 2 hrs	Torque slip characteristics –starting and speed control of induction motors, Single phase induction motors and universal motors	

9	V week of February (26 th & 27 th) 2 hrs	Electric drive for general factory, textile mill - pump, blowers, hoists, traction etc-group and individual drives	Lecture(Chalk&board / Power point presentation)
10	II week of March (5 th – 9 th) 3 hrs	Construction and working of dynamometer type watt meters and induction type energy meters.	
11	III week of March (12 th – 16 th) 3 hrs	Control System – open loop and closed loop systems- transfer function - time response of second order system	
12	IV week of March (19 th – 23 rd) 3 hrs	Laboratory session 4.Swinburne's test 5.Semiconductor junction diode V-I characteristics 6.Semiconductor zener diode V-I characteristics	PRACTICAL EXPERIMENTATION
13	26 th March	Assessment 2	Descriptive Type
14	I week of April (2 nd – 6 th) 3 hrs	frequency response method - polar plot Laboratory session 7.MATLab simulation of Polar plot	Lecture(Chalk&board / Power point presentation)
15	II week of April (9 th & 10 th) 2 hrs	Concept of stability - application of routh criterion for simple systems	Lab(Practical experimentation)

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test- 1	19 th February	1 hour	20
2	Cycle test- 2	26 th March	1 hour	20
3	Assignment			10
4	Laboratory			20
CPA	Compensation Assessment*	13 th April	1 hour	20
6	Final Assessment *	Month of April	3 hours	50

*mandatory; refer to guidelines on page 4

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Palani, S. Control Systems ,ShanmugaPriya Publishers, 1995.

2. Theraja, B.L., Electrical Technology, Vol. 1 and 2, S.Chand and Co. Ltd, 23rd and 24th Edition,2009.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. Student's feedback through Class – Committee Meetings
2. Anonymous feedback from students using questionnaire

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

ATTENDANCE

1. Every student should maintain 75% attendance, if not they have to redo the course.
2. Students who have missed the regular lab class should get the prior permission for attending compensation lab class

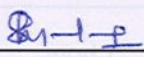
ACADEMIC HONESTY & PLAGIARISM

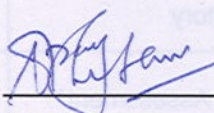
1. All the students are expected to be genuine during the course work. Taking information by copying another student's paper or using study material of any form during any assessments is considered dishonest.
2. Any evidence of such academic dishonesty will result in loss of marks in that assessment. Additionally names of such students will be reported to Class Committee Chairperson and HOD for necessary actions.
3. Students who honestly produce ORIGINAL and OUTSTANDING work will be rewarded

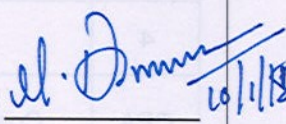
ADDITIONAL INFORMATION

1. The Course Coordinator is available for consultation during the time intimated to the students then and there.
2. All correspondence will be sent to webmail id of the students alone. Hence all students are advised to check their webmail regularly.

FOR APPROVAL

Course Faculty 

CC-Chairperson 

HOD  10/1/18

DEPARTMENT OF PRODUCTION ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	ELECTRICAL AND CONTROL SYSTEMS		
Course Code	PRPC19	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEIR11		
Session	July/ Jan. <u>2018</u>	Section (if, applicable)	<u>A</u> / B
Name of Faculty	Ms.S.MALARVILI	Department	EEE
Email	--	Telephone No.	--
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
DC machines - Characteristics - Starting and speed control of DC motors. Transformers: (Single phase only)- equivalent circuit and regulation - losses and efficiency - auto transformer. Alternators - EMF equation - regulation by synchronous impedance method - Synchronous motors starting and applications. Three - phase induction motor - Cage and slip ring motors -torque slip characteristics –starting and speed control of induction motors - single phase induction motors and universal motors. Electric drive for general factory, textile mill - pump, blowers, hoists, traction etc. - group and individual drives - Construction and working of dynamometer type watt meters and induction type energy meters. Control System – open loop and closed loop systems- transfer function - time response of second order system - frequency response method - polar plot. Concept of stability - application of routh criterion for simple systems			
COURSE OBJECTIVES			
This course is designed to apply concepts of electrical drives and control systems to various industrial applications and to test various electrical equipments.			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
1. To understand the concepts of transformers and DC machines	PO ₁ , PO ₆ , PO ₇ – PO ₁₂		
2. To understand open loop and closed loop system	PO ₁ , PO ₆ , PO ₇ – PO ₁₂		
3. To conduct exercises for learning DC motors	PO ₁ , PO ₆ , PO ₇ – PO ₁₂		

COURSE PLAN – PART II

COURSE OVERVIEW

This course examines the basic theory, characteristics, construction operation and application of rotating electrical machines. It includes the study of direct current motors, direct current generators, alternators, synchronous motors, polyphase induction motors and single phase motors. This course provides an introduction to linear systems, transfer functions, and Laplace transforms. It covers stability and feedback, and provides basic design tools for specifications of transient response. It also briefly covers frequency-domain techniques.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	II week of January (10 th – 12 th) 3 hrs	Introduction to the course, DC machines- Characteristics – Starting and speed control of DC motors	
2	III week of January (17 th – 19 th) 3 hrs	Transformers: (Single phase only)- equivalent circuit and regulation	
3	IV week of January (24 th & 25 th) 2 hrs	Transformer: losses and efficiency - auto transformer	Lecture(Chalk&board / Power point presentation)
4	V week of January (31 st) & (1 st & 2 nd)February 3 hrs	Laboratory session 1. No - load speed characteristics of D.C. shunt motor 2. Load test on D.C.Shunt generator 3. Equivalent circuit of single - phase transformer	Lab(Practical experimentation)
5	II week of February (7 th – 9 th) 3 hrs	Alternators - EMF equation - regulation by synchronous impedance method	
6	III week of February (14 th – 16 th) 3 hrs	Synchronous motors starting and applications, Three - phase induction motor - Cage and slip ring motors	
7	21 st February	Assessment 1	Descriptive type
8	IV week of February (22 nd & 23 rd) 2 hrs	Torque slip characteristics –starting and speed control of induction motors, Single phase induction motors and universal motors	

9	V week of February (28 th) & 1 st March 2 hrs	Electric drive for general factory, textile mill - pump, blowers, hoists, traction etc-group and individual drives	Lecture(Chalk&board / Power point presentation)
10	II week of March (7 th – 9 th) 3 hrs	Construction and working of dynamometer type watt meters and induction type energy meters.	
11	III week of March (14 th – 16 th) 3 hrs	Control System – open loop and closed loop systems- transfer function - time response of second order system	
12	IV week of March (21 st – 23 rd) 3 hrs	Laboratory session 4.Swinburne's test 5.Semiconductor junction diode V-I characteristics 6.Semiconductor zener diode V-I characteristics	PRACTICAL EXPERIMENTATION
13	28 th March	Assessment 2	Descriptive Type
14	I week of April (4 th – 6 th) 3 hrs	frequency response method - polar plot Laboratory session 7.MATLab simulation of Polar plot	Lecture(Chalk&board / Power point presentation) Lab(Practical experimentation)
15	II week of April (11 th & 12 th) 2 hrs	Concept of stability - application of routh criterion for simple systems	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test- 1	21 st February	1 hour	20
2	Cycle test- 2	28 th March	1 hour	20
3	Assignment			10
4	Laboratory			20
CPA	Compensation Assessment*	13 th April	1 hour	20
6	Final Assessment *	Month of April	3 hours	50

***mandatory; refer to guidelines on page 4**

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Palani, S. Control Systems ,ShanmugaPriya Publishers, 1995.

2. Theraja, B.L., Electrical Technology, Vol. 1 and 2, S.Chand and Co. Ltd, 23rd and 24th Edition,2009.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. Student's feedback through Class – Committee Meetings
2. Anonymous feedback from students using questionnaire

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

ATTENDANCE

1. Every student should maintain 75% attendance, if not they have to redo the course.
2. Students who have missed the regular lab class should get the prior permission for attending compensation lab class

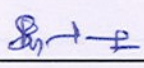
ACADEMIC HONESTY & PLAGIARISM

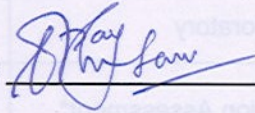
1. All the students are expected to be genuine during the course work. Taking information by copying another student's paper or using study material of any form during any assessments is considered dishonest.
2. Any evidence of such academic dishonesty will result in loss of marks in that assessment. Additionally names of such students will be reported to Class Committee Chairperson and HOD for necessary actions.
3. Students who honestly produce ORIGINAL and OUTSTANDING work will be rewarded

ADDITIONAL INFORMATION

1. The Course Coordinator is available for consultation during the time intimated to the students then and there.
2. All correspondence will be sent to webmail id of the students alone. Hence all students are advised to check their webmail regularly.

FOR APPROVAL

Course Faculty 

CC-Chairperson 

HOD 

10/1/18