



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech. – Power Electronics		
Course Title	Power Electronic Drives		
Course Code	EE654	No. of Credits	03
Course Code of Pre-requisite subject(s)	A Course in Power Electronics and electrical machines		
Session	JAN 2021	Section (if, applicable)	-
Name of Faculty	Dr. M Sahoo	Department	EEE
Official Email	sahoo@nitt.edu	Telephone No.	
Name of Course Coordinator(s) (if, applicable)	NA		
Official E-mail	NA	Telephone No.	NA
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Basic power electronic drive system, components. Different types of loads, shaft-load coupling systems. Stability of power electronic drive.</p> <p>Conventional methods of D.C.motor speed control, single phase and three phase converter fed D.C motor drive. Power factor improvement techniques, four quadrant operation.</p> <p>Chopper fed drives, input filter design. Braking and speed reversal of DC motor drives using choppers, multiphase choppers. PV fed DC drives.</p> <p>Conventional methods of induction motor speed control. Solid state controllers for Stator voltage control, soft starting of induction motors, Rotor side speed control of wound rotor induction motors. Voltage source and Current source inverter fed induction motor drives d-q axis modeling and vector control.</p> <p>Speed control of synchronous motors, field oriented control, load commutated inverter drives, switched reluctance motors and permanent magnet motor drives. Introduction to design aspects of machines.</p> <p>Reference Books:</p> <ol style="list-style-type: none"> 1. P.C Sen, 'Thyristor DC Drives', John wiley and Sons, New York 1991. 2. R Krishnan, 'Electric Motor drives- Modeling, Analysis and control', Prentice Hall of India Pvt. Ltd, New Delhi, 2003. 3. Bimal Kumar Bose., 'Modern Power Electronics and AC Drives', Pearson education Pvt Ltd, New Delhi, 2003 			
COURSE OBJECTIVES			
To introduce basic concepts of load and drive interaction, speed control concepts of ac and dc drives, speed reversal, regenerative braking aspects, design methodology.			



MAPPING OF COs with POs	
Course Outcomes:	Programme Outcomes (PO)
1. Understand and analyze dc and ac motors supplied from different power converters.	PO1 to PO3 and PO5 to PO14
2. Simulate and study motor characteristics with different converter configurations	PO1 to PO3 and PO5 to PO14
3. Design and implement a prototype drive system..	PO1 to PO3 and PO5 to PO14

COURSE PLAN – PART II

COURSE OVERVIEW

Students can understand and analyze DC and AC motors fed different power converter based sources. Further they will be exposed to various motor characteristics and its control as well as can design a drive system based on various load torque profile. They will learn the designing of the drive system and will be able to simulate it.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 to 3	Basic power electronic drive system, components. Different types of loads, shaft-load coupling systems. Stability of power electronic drive.	Online lecture
2	Week 4 to 6	Conventional methods of D.C.motor speed control, single phase and three phase converter fed D.C motor drive. Power factor improvement techniques, four quadrant operation.	Online lecture
3	Week 7 to 9	Chopper fed drives, input filter design. Braking and speed reversal of DC motor drives using choppers, multiphase choppers. PV fed DC drives.	Online lecture
4	Week 10 to 12	Conventional methods of induction motor speed control. Solid state controllers for Stator voltage control, soft starting of induction motors, Rotor side speed control of wound rotor induction motors. Voltage source and Current source inverter fed induction motor drives d-q axis modeling and vector control.	Online lecture



5	Week 12 to 14	Speed control of synchronous motors, field oriented control, load commutated inverter drives, switched reluctance motors and permanent magnet motor drives. Introduction to design aspects of machines.	Online lecture	
Course Assessment Methods				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-1 (CT-1) (Written Test)	6 th week	2 hr	20
2	Assessment-2 (CT-2) (Written Test)	12 th week	2 hr	20
3	Assessment-3 (Mini course Project)	will be carried out along with the course		20
4	Assessment-4 (Surprize Test – 2 Nos.)	will be conducted along with the course		10
5 (CPA)	Compensation Assessment* (Written Test)	16 th week	2 hr	20
6	Final Assessment (Assessment-5) (Written Test)	17 th week	2 hr	30
*mandatory; refer to guidelines on page 4				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
<ul style="list-style-type: none"> • Feedback from students during class committee meetings • Feedback through questionnaire 				
COURSE POLICY (including compensation assessment to be specified)				
<ul style="list-style-type: none"> • The above course has 6 assessments in total (A1, A2, A3, A4, A5, CPA) • If any student is not able to attend 1st/2nd Assessment due genuine reason, compensation assessment for him/her is permitted. In any case, compensation will not be considered as an improvement test. There will be no compensation assessment for Assessment-3 and Assessment-4. • The compensation assessment will include the portion in A1 and A2 				
ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none"> ➤ At least 75% attendance in each course is mandatory. ➤ A maximum of 10% shall be allowed under On Duty (OD) category. ➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade. 				
ACADEMIC DISHONESTY & PLAGIARISM				



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- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

- The faculty is available for consultation at times as per the information given by the faculty.
- Queries and feedback may also be emailed to the faculty directly: email: **sahoo@nitt.edu**

FOR APPROVAL

Course Faculty 
21/01/2021

CC- Chairperson 

Approved by Mail

HOD _____



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.