



**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGG**

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	3
Course Code of Pre-requisite subject(s)	A Course in Power Electronics and electrical machines		
Session	Jan 2023	Section (if, applicable)	
Name of Faculty	Dr. Sundareswaran K	Department	Electrical and Electronics Engineering
Email	kse@nitt.edu	Telephone No.	0431-2503255
Name of Course Coordinator(s) (if, applicable)	--		
E-mail	--	Telephone No.	--
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective Course	<input type="checkbox"/> Laboratory course
<b>Syllabus (approved in BoS)</b>			
Basic power electronic drive system, components. Different types of loads, shaft-load coupling systems. Stability of power electronic drive.			
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.			
Chopper fed drives, input filter design. Braking and speed reversal of DC motor drives using choppers, multiphase choppers. PV fed DC drives.			
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.			
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.			
<b>Reference Books:</b>			
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			
4. Sundareswaran K, "Elementary concepts of Power Electronic Drives", CRC Press, 2019.			
<b>COURSE OBJECTIVES</b>			
To introduce basic concepts of load and drive interaction, speed control concepts of ac and dc drives, speed reversal, regenerative braking aspects, design methodology.			
<b>MAPPING OF COs with POs</b>			
<b>Course Outcomes:</b>		<b>Programme Outcomes (PO)</b>	
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.	Offline teaching mode
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.	Offline teaching mode
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.	Offline teaching mode
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.	Offline teaching mode
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.	Offline teaching mode

#### COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-I (First cycle test) (Module I and II)	6 <sup>th</sup> week	1.5 hour	20
2	Assessment-II (Second cycle test) (Module III and IV)	12 <sup>th</sup> week	1.5 hour	20
3	Continuous assessment	Solution to numerical examples during the course (continuous)		10



CPA	Compensation test (First four modules)	End of 14 <sup>th</sup> week	1.5 hour	20
4	End Semester Exam (All five modules)	17 <sup>th</sup> week	3 hours	50
*mandatory; refer to guidelines on page 3				

### COURSE EXIT SURVEY

(Mention the ways in which the feedback about the course shall be assessed)

- Feedback from students during class committee meetings
- Feedback through questionnaire

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

**ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)**

- **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

- 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.

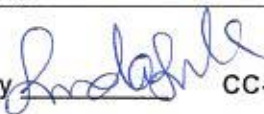

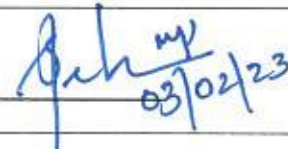
### COMPENSATION ASSESSMENT

- Attending all the assessments (1-4) is mandatory for every student. Flexibility is given to the students to fix the date for each mode of evaluation convenient to majority of the students. If any student fails to attend the cycle tests/assessments due to genuine reason like medical emergency, the student may be permitted to appear the compensation test on submission of appropriate documents as proof. In any case, compensation test is not considered as an improvement test.
- The minimum marks for passing this course and grading pattern will adhere to the regulations of the institute.

### ADDITIONAL INFORMATION if any

1. The faculty is available for consultation during the time intimated to the students then and there.
2. All Correspondence will be sent to the webmail id of the students alone if required.
3. The students will be communicated through the email id: [kse@nitt.edu](mailto:kse@nitt.edu) for any academic related issues (including sharing of study materials) with respect to this course.

### FOR APPROVAL

Course Faculty  CC-Chairperson  HOD  03/02/23



**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.