DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI - 620 015, TAMIL NADU, INDIA

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-requisites	A Course in Power Electronics and electrical machines		
Session	January 2024	Section (if, applicable)	
Name of the Faculty	Dr. Josephine R.L	Department	Electrical and Electronics Engineering
E-mail	josephinerl@nitt.edu	Telephone No.	043-125-04085
Course Coordinator(s) (if, applicable)	-		
E-mail	-	Telephone No.	-
Course Type	■ Core		
	Elective		
	Open Elective		
	Laboratory		

COURSE CONTENT (Approved in Senate)

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.

References

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.

COURSE LEARING 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.

COURSE OUTCOMES (CO)

Course Outcomes		Aligned Programme Outcomes(PO)
After successful completion of the course, the students should be capable to:		
CO1	Understand and analyze dc and ac motors supplied from different power converters.	
CO2	Simulate and study motor characteristics with different converter configurations.	
CO3	Design and implement a prototype drive system.	

	1	2	3
CO1	3	3	2
CO2	3	3	3
CO3	3	3	3
CO4	-	-	-

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

Sl. No.	Week	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.	Chalk & Talk
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.	Chalk & Talk
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.	Chalk & Talk
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.	Chalk & Talk
5.	Week 12 to 15	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.	Chalk & Talk

COURSE ASSESSMENT METHODS

Sl. No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Assessment-I (First cycle test) (Module I and II)	5th week	60 min	25
2.	Assessment-II (Second cycle test) (Module III and IV)	10th week	60 min	25
3.	Continuous assessment	Assignments/ Quiz/Objective/ Subjective tests	-	20
4.	Compensation test(First four modules)	End of 14th week (60 min)	60min	25
5.	End Semester Exam(All five modules)	16th/17th week (3 hours)	180min	30

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

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

COURSE POLICY (including compensation assessment to be specified)

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

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 students fails to attend the cycle tests 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.

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. Students awarded 'V' grade must compulsorily redo the course.

ACADEMIC DISHONESTY AND PLAGIARISM

Academic Dishonesty

a) Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
b) Zero mark to be awarded to the offenders. For copying from another student, both students get the same penalty of zero mark.
c) The department disciplinary committee constituted with the faculty member, PAC Chairperson, and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student found guilty, The report shall be submitted to the Academic office.

ADDITIONAL COURSE INFORMATION

1. **The faculty is available for consultation during the time intimated to the students then andthere.**
2. **All Correspondence will be sent to the webmail id of the students alone if required. The students will be communicated through the email id: josephinerl@nitt.edu for any academicrelated issues (including sharing of study materials) with respect to this course.**

FOR APPROVAL

Josephine RL 22/01/2024
Course Faculty
(Josephine. R. L)

22/1/24
Chairperson (Class Committee)

HoD 22/01/24

Guidelines

a. The number of assessments for any course shall range from 4 to 6.
b. The following will be the weightages for different courses:
   Assessments during the session: 50-70 %
   Final assessment: 30-50 %
c. The course plan shall outline the policy and eligibility criteria for compensation assessment for the students who fail to attend the regular assessment process during the course due to genuine reasons.
d. A minimum of 30% should be scored in the final assessment (for all courses) for a pass. The passing minimum for all the courses shall be the maximum of 35% or Class Average/2.
e. The award of "S" grade in theory courses for PG programs is restricted to a maximum of 10% of the total number of students appeared for the theory courses. The award of "S" grade for laboratory courses and Project work for the PG programs is restricted to 20% of the total number of students appeared for the course.
f. Absolute Grading policy shall be incorporated if the number of students per course is less than 10.

Absolute Grading	
Mark Range	**Grade to be Awarded**
91 - 100	S
81 - 90	A
71 - 80	B
61 - 70	C
51 - 60	D
Maximum of (35% or Class Average/2) - 50	E
< Maximum of (35% or Class Average/2)	F