



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OUTLINE TEMPLATE			
Course Title	POWER ELECTRONIC SYSTEMS		
Course Code	EEMI14	No. of Credits	3
Department	Electrical and Electronics Engineering	Faculty	Dr. S. Senthil Kumar
Pre-requisite Course	ELECTRICAL MACHINES (EEMI11)		
Course Coordinator	Dr. S. Senthil Kumar		
E-mail	skumar@nitt.edu	Telephone No.	0431 – 2503261
Course Type	Core course		
COURSE OVERVIEW			
<p>Power Electronic Systems is a fundamental course in the B.Tech curriculum that introduces undergraduate students to the principles, applications, and design of electronic devices used for the conversion and control of electrical power. The course covers essential topics such as semiconductor devices, rectifiers, inverters, and DC-DC converters, providing students with a comprehensive understanding of power electronic circuits and their functionalities. Through theoretical lectures and practical exercises, students will learn how to analyze, design, and troubleshoot power electronic systems used in various applications, including renewable energy, motor drives, and power supplies. This course equips students with the necessary knowledge and skills to contribute to the development of efficient and sustainable energy solutions in modern industries.</p>			
COURSE OBJECTIVES			
To introduce characteristics of power electronic devices, design of various power converter			

circuits and speed control concepts of AC and DC drives.

COURSE OUTCOMES (CO)

Course Outcomes

On completion of the course, the students will be able to

1. Identify various power electronic devices and plot their switching characteristics.
2. Design DC power conversion circuits for simple applications.
3. Design DC power conversion circuits for simple applications.
4. Perform speed control of dc and induction motors.

Course articulation matrix (CO-PO mapping)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	-	-	-	1	-	1	1	2
CO2	2	2	1	2	-	-	-	-	-	1	1	2
CO3	3	3	2	3	2	-	2	2	-	2	2	3
CO4	3	3	2	3	2	-	2	2	-	2	2	3
CO5	2	2	2	2	-	-	-	-	-	1	1	3

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week / Contact Hours	Topic	Mode of Delivery (Offline)
1.	Week -1 31 st July – 4 th August 2023 (3 Contact Hours)	Power Semiconductor Devices power diodes, power transistors Principle of operation, characteristics, ratings,	Lecture/PPT
2.	Week -2 7 th – 11 th August 2023 (4 Contact Hours)	Power Semiconductor Devices SCRs, TRIAC, GTO Principle of operation, characteristics, ratings,	Lecture/PPT
3.	Week -3 14 st – 18 th August 2023 (4 Contact Hours)	Power Semiconductor Devices power MOSFETs, IGBTs Principle of operation, characteristics, ratings,	Lecture/PPT
4.	Week – 4 21 st – 25 th August 2023	protection and gate drive circuits of Power Semiconductor Devices	Lecture/PPT

	(3 Contact Hours)		
5.	Week – 5 28 th August – 1 st September 2023 (4 Contact Hours)	Assessment – 1	Lecture / PPT Written test/Quiz (Objective NOT MCQ)
6.	Week – 6 4 th – 8 th September 2023 (4 Contact Hours)	Study of AC to DC power converter	Lecture/PPT
7.	Week – 7 11 th – 15 th September 2023 (4 Contact Hours)	Study of AC to AC power converters	Lecture/PPT
8.	Week – 8 18 th – 22 nd September 2023 (4 Contact Hours)	Study of AC to AC power converters	Lecture/PPT
9.	Week – 9 25 th – 29 th September 2023 (3 Contact Hours)	PWM based Power Converters: DC to DC	Lecture/PPT
10.	Week - 10 2 nd - 6 th October 2023 (4 Contact Hours)	Assessment – 2	Lecture/PPT Written test/Quiz (Objective NOT MCQ)
11.	Week – 11 9 th – 13 th October 2023 (4 Contact Hours)	PWM based Power Converters: DC to AC	Lecture/PPT
12.	Week - 12 16 th – 20 th October 2023 (4 Contact Hours)	PWM based Power Converters: DC to AC	Lecture/PPT
13.	Week - 13 23 th – 27 th October 2023 (4 Contact Hours)	Introduction to motor drives	Lecture/PPT
14.	Week - 14 30 th October – 3 rd November 2023 (3 Contact Hours)	Solid-state speed control of DC motor drive system	Lecture/PPT

15.	Week - 15 6 th – 10 th November 2023 (4 Contact Hours)	Solid-state speed control of induction motor drive system.	Lecture/PPT
16.	Week - 16 13 th – 17 th November 2023 (4 Contact Hours)	Assessment – 3	Group Activity
17.	Week - 17 20 th – 24 th November 2023, (2 Contact Hours)	Compensation Test	Written test/Quiz (Objective NOT MCQ)
18.	Week - 18 27 th November – 1 st December 2023 (3 Contact Hours)	Assessment - 4	End semester exam - Descriptive type

COURSE ASSESSMENT METHODS

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment -1	Week - 5 28 th August – 1 st September 2023	2 hrs	20%
2.	Assessment -2	Week - 10 2 nd - 6 th October 2023	2 hrs	20%
3.	Assessment -3 Group Activity	Week - 16 13 th – 17 th November 2023	-----	10%
4.	Compensation Test	Week - 17 20 th – 24 th November 2023	2 hrs	20%
5.	Assessment - 4 End Semester Exam	Week - 18 27 th November – 1 st December 2023	3 hrs	50%

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

1. Rashid, M.H, 'Power Electronics - Circuits, Devices and Applications', Prentice Hall Publications, 3 rd Edition, 2003.
2. P.C Sen, 'Thyristor DC Drives', John Wiley and Sons, New York, 1991.
3. R. Krishnan, 'Electric Motor Drives – Modeling, Analysis and Control', Prentice-Hall of India Pvt. Ltd., New Delhi, 2003.
4. P.S. Bhimbra, 'Power Electronics', Khanna Publishers, 4th Edition, 2010.

COURSE EXIT SURVEY

1. Students' feedback through class committee meetings
2. Feedback questionnaire from students – twice during the semester
3. Feedback from students on Course Outcomes at the end of the semester

COURSE POLICY

1. All the students are expected to attend all the contact hours. Anyhow attendance is not expected for discussion classes on video lectures.
2. No retest will be conducted for those students who are being physically absent for any of the evaluation/assessment methods. Anyhow flexibility is given to the students to fix the date for each mode of evaluation convenient to all the students. In case of emergency, the student may submit compensatory assignments on submission of appropriate documents as proof. Compensatory assignments would be framed according to the time frame available, and the assessment task missed by the students.
3. Relative grading with a passing minimum is as per our institute norms.
4. In case of any student is found guilty of indulging in any malpractice, he/she will be awarded no marks in that particular assessment. If found using mobile phones or any other gadgets for any malpractice during the final written examination, the answer sheet of the student will not be evaluated and will be awarded ZERO marks in the final written examination.

ADDITIONAL COURSE 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 the webmail id of the students alone. Hence all students are advised to check their webmail ids regularly.
3. The students will be communicated through the email id: skumar@nitt.edu for any academic-related issues (including sharing of study materials) with respect to this course.

MODE OF CORRESPONDENCE (email/ phone etc)

skumar@nitt.edu / 0431 – 2503261

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.

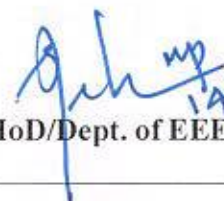
ACADEMIC DISHONESTY & PLAGIARISM

- 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.

FOR APPROVAL


Dr. S. Senthil Kumar, Asso.Prof./EEE
Course Faculty

CC-Chairperson


HoD/Dept. of EEE
14/08/23

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.