Lesson Plan

Faculty :Shilpa Patil

Academic year: 2019-20

CLASS		BE Electronics, Semester VII			
Academic Term		July-December 2019			
Subject		**Power Electronics (ELX702)**			
Periods (Hours) per week	***Lecture***	***4***			
	Practical	***--***			
	Tutorial	***--***			
Evaluation System		***Hours***	***Marks***		
	Theory examination	3	80		
	Internal Assessment	--	20		
	Practical Examination	--	--		
	Oral Examination	--	--		
	Term work	--	--		
	Total	--	100		
Time Table	***Day***	***Time***			
	Tuesday	2.30 pm to 3.30 pm			
	Wednesday	8.45am to 9.45 am			
	Thursday	8.45am to 9.45 am			
	Friday	3.30 pm to 4.30 pm			
Course Content and Lesson plan					
We	**Lecture**	**Date**	**Topic**	**Mapping**	**Remark**

ek	No.	Planned	Actual		References	CO	PO	
Module 1: Power semiconductor devices								
1	1	02/07/19		SCR construction, operation, static characteristic	Ref. 1,2,4	CO1	PO1	
	2	03/07/19		Turn ON and Turn OFF dynamic characteristic	Ref. 1,2,4	CO1	PO1	
	3	04/07/19		Gate Characteristic	Ref.2	CO1	PO1	
	4	05/07/19		Principle of operation, characteristics, ratings and applications of: Triac	Ref. 2,4	CO1	PO1	
2	5	09/07/19		Diac: structure, working principle, ratings, Characteristics, Applications	Ref. 2,4	CO1	PO1	
	6	10/07/19		Power BJT: structure, working principle, ratings, Characteristics, Applications	Ref. 1, 4	CO1	PO1	
	7	11/07/19		Power MOSFET:working principle, characteristics,	Ref. 2,4	CO1	PO1	
	8	12/07/19		IGBT: working principle, characteristics, SOA	Ref. 2,4	CO1	PO1	
	Module 2: SCR Triggering, commutation and Protection Circuits							
3	9	16/07/19		Triggering methods of SCR, Gate triggering: R, RC triggering	Ref.2	CO1	PO1	
	10	17/07/19		UJT characteristic and UJT triggering ckt. Operation	Ref.2	CO1	PO1	

	11	18/07/19		Ramp and pedestal, inverse cosine	Ref.2	CO1	PO1	
	12	19/07/19		Design problems on gate triggering ckt.	Ref.2	CO1	PO1, PO3	
4	13	23/07/19		Commutation circuits: Class A, Class B	Ref.2	CO1	PO1, PO3	
	14	24/07/19		Commutation circuits: Class C, D	Ref.2	CO1	PO1, PO3	
	15	25/07/19		Commutation circuits: Class E, F	Ref.2	CO1	PO1, PO3	
	16	26/07/19		Protection of SCR	Ref.2	CO1	PO1	
	Module 3: Single Phase Controlled Rectifiers							
5	17	30/07/19		Half wave controlled rectifier with R and R-L load, effect of free-wheeling diode	Ref. 1,2,3,4	CO2	PO1, PO2	
	18	31/07/19		Full wave half controlled rectifier with R , R-L load, effect of free-wheeling diode	Ref. 1,2,3,4	CO2	PO1, PO2	
	19	01/08/19		Full wave fully controlled rectifier with R, R – L, effect of free- wheeling diode	Ref. 1,2,3,4	CO2	PO1, PO2	
	20	02/08/19		Definitions and significance of input and output performance parameters	Ref. 1,2,3,4	CO2	PO1, PO2	
6	21	06/08/19		Calculation of performance parameters				
	22	07/08/19		Calculation of performance				

				parameters				
	Module 4: Inverters							
	23	08/08/19		Inverter basics and applications, Series Inverter	Ref. 1,2,3,4	CO2	PO1	
	24	09/08/19		Parallel inverters	Ref. 1,2,3,4	CO2	PO1	
7	***Unit Test 1 on 13, 14, 16 August 2019***							
8	25	20/08/19		Principle of operation of Half Bridge Inverter-R and RL load	Ref. 1,2,3,4	CO2	PO1	
	26	21/08/19		Principle of operation of Full Bridge Inverter-R and RL load	Ref. 1,2,3,4	CO2	PO1	
	27	22/08/19		Performance parameters of Inverter, Numerical problems on inverters	Ref. 1,2,3,4	CO2	PO1, PO2	
9	28	27/08/19		Voltage control using PWM technique	Ref. 1,2,3,4	CO2	PO1	
	29	28/08/19		Various PWM techniques	Ref. 1,2,3,4	CO2	PO1	
	30	29/08/19		Harmonics, effect of harmonics, Harmonic Neutralization	Ref. 1,2,3,4	CO2	PO1,	
	Module 5: DC-DC converters							
	31	30/08/19		Numerical problems	Ref. 2,3,4	CO2	PO1	
10	***Semester Brake***							

11	32	11/09/19		Basic principle of step up and step down DC-DC converters	Ref. 2,3,4	CO2	PO1	
	33	12/09/19		Buck Boost Converter	Ref. 2,3,4	CO2	PO1	
	34	13/09/19		Cuk Converter	Ref. 2,3,4	CO2	PO1	
12	35	17/09/19		Voltage commutated converters	Ref. 2,3,4	CO2	PO1	
	36	18/09/19		Current commutated converters	Ref. 2,3,4	CO2	PO1	
	37	19/09/19		Load commutated Converters	Ref. 2,3,4	CO2	PO1	
	38	20/09/19		Applications in SMPS, Battery charging systems	Ref. 2	CO2	PO1	Students Presentations
13	39	24/09/19		Numerical problems on dc-dc converters	Ref. 2,3,4	CO2	PO1, PO2	
	Module 6: A.C.Voltage Controller and Cyclo-converters							
	40	25/09/19		Principle of On-Off, Principle of phase control	Ref. 2,4	CO4	PO1	
	41	26/09/19		Single phase bidirectional control of R load and R-L load	Ref. 2,4	CO4	PO1	
14	42	01/10/19		1 phase Cyclo-converter and applications	Ref. 2	CO4	PO1	Flipped classroom
	43	03/10/19		3 phase Cyclo-converter and applications	Ref. 2	CO4	PO1	

	44	04/10/19		Students' presentations on Power Electronics applications		CO2	PO1, PO2	Students Presentations
Unit Test 2 on 14, 15, 16 October 2019								

Reference Books:

Sr. No.	Authors, Title and Publisher of the book	Number of copies available in library
1	M. Rashid, Power Electronics: Circuits, Devices, and Applications, PHI, 3rd Edition	33 (+15 book bank)
2	M. D. Singh, K. B. Khanchandani, Power Electronics, Tata McGraw Hill, 2nd Edition	12 (+15 book bank)
3	Mohan, Undeland and Robbins, Power Electronics: Converters, Applications and Design, Wiley (Student Edition), 2nd Edition	12
4	NPTEL lectures and notes on Power Electronics	Online

Internal Assessment (IA):

Two tests will be conducted which should cover at least 80% of syllabus. The average marks of both the tests will be considered as final IA marks.

End Semester Examination:

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
3: Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 5 marks will be asked.
4: Remaining questions will be selected from all the modules.

Examination Scheme:

Module		Lecture Hours	Marks distribution in Test (For internal assessment/TW)		Approximate Marks distribution in Sem. End Examination
			Test 1	Test 2	
1	Switching Devices	8	10	0	20
2	SCR: Triggering, Commutation , Protection	8	10	6	20
3	Single phase Controlled Rectifiers	6	10	0	20
4	Inverters	9	0	12	25
5	DC-DC converters	8	0	10	20
6	A.C. voltage Controllers and Cyclo-Convereters	4	0	8	15

Submitted By	**Approved By**
Shilpa J. Patil	i) Prof. K. Narayanan Sign:
Sign:	ii) Prof. SapnaPrabhu Sign:
	iii) Prof. Monica Khanore Sign:
Date of Submission: 15/7/2019	**Date of Approval:**
Remarks by PAC (if any)	