Vision of the Institute

To be among the best of the institutions for engineers and technologists with attitudes, skills and knowledge and to become an epicenter of creative solutions.

Mission of the Institute

To achieve and impart quality education with an emphasis on practical skills and social relevance.

Vision of the Department

To impart technical knowledge and skills required to succeed in life, career and help society to achieve self sufficiency.

Mission of the Department

- To become an internationally leading department for higher learning.
- To build upon the culture and values of universal science and contemporary education.
- To be a center of research and education generating knowledge and technologies which lay groundwork in shaping the future in the fields of electrical and electronics engineering.
- To develop partnership with industrial, R&D and government agencies and actively participate in conferences, technical and community activities.

Department of Electrical & Electronics Engineering

Programme Educational Objectives (B.Tech. – EEE)

This programme is meant to prepare our students to professionally thrive and to lead.

During their progression:

Graduates will be able to

PEO 1: Have a successful technical or professional careers, including supportive and leadership roles on multidisciplinary teams.

PEO 2: Acquire, use and develop skills as required for effective professional practices.

PEO 3: Able to attain holistic education that is an essential prerequisite for being a responsible member of society.

PEO 4: Engage in life-long learning, to remain abreast in their profession and be leaders in our technologically vibrant society.

Programme Outcomes (B.Tech. – EEE)

At the end of the Programme, a graduate will have the ability to

PO 1: Apply knowledge of mathematics, science, and engineering.

PO 2: Design and conduct experiments, as well as to analyze and interpret data.

PO 3: Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PO 4: Function on multi-disciplinary teams.

PO 5: Identify, formulates, and solves engineering problems.

PO 6: Understanding of professional and ethical responsibility.

PO 7: Communicate effectively.

PO 8: Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

PO 9: Recognition of the need for, and an ability to engage in life-long learning.

PO 10: Knowledge of contemporary issues.

PO 11: Utilize experimental, statistical and computational methods and tools necessary for engineering practice.

PO 12: Demonstrate an ability to design electrical and electronic circuits, power electronics, power systems; electrical machines analyze and interpret data and also an ability to design digital and analog systems and programming them.

PEOs & POs Mapping

Programme Educational Objectives (PEO)	Program Outcomes (PO)												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	H	M	H	M	M		M	H		M	M	H	M	H
2	M	M	H	H	M	M		M	H	H		H	M	H
3				H	H	H	H		M	H	H		M	H
4	M		H	H		M	H	H		M		H	M	H

* H: Strongly Correlating (3); M: Moderately Correlating (2);& L: Weakly Correlating (1);

relating (1)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics Engineering

GRIET/PRIN/06/G/01/22-23

BTech - EEE - A

DAY/ HOUR	9:00 - 9:55	9:55- 10:50	10:50 - 11:45	11:45 -12:25	12:25-1:15	1:15 - 2:05	2:05 -2:55	2:55-3:55	
MONDAY	EAE	SMI		**BREAK**	Mentoring	IoT		VAC	**Theor**
TUESDAY	SMI		PLC		SMI Lab (A1)/ PSA Lab (A2)			VAC	
WEDNESDAY	MPE/HVDCT		SMI		SMI Lab (A2)/ PSA Lab (A1)			VAC	
THURSDAY	MPE/HVDCT	PLC			Mentoring	EAE		VAC	**Class**
FRIDAY	MP Lab				IoT	MPE/HVDCT		VAC	
SATURDAY	PLC		Library		MP Lab/Mentoring/Student Techincal Activites				

Subject Code	Subject Name	Faculty Code	Faculty Name	Alr
GR20A3081	Programmable Logic Controllers (PLC)	PK	P. Prasanth Kumar	1st Spell of Instructions
GR20A3092	Sensors Measurements and Instrumentation (SMI)	Dr. PSVD	Dr. P. Srividya Devi	1st Mid-term Examinations
GR20A2004	Economics and Accounting for Engineers (EAE)	KKSK	K. K. Sunil Kumar	2nd Spell of Instructions
GR20A3093	Modern Power Electronics (MPE)	Dr. PB	Dr. B. Pakkiraiah	Summer Vacation
GR20A3094	HVDC Transmission Systems (HVDCTS)	Dr.JS	Dr. J. Sridevi	2nd Spell of Instructions Contd.
GR20A6004	Internet of Things (Open Elective - II)	DSR	D. Srinivasa Rao	2nd Mid-term Examinations
GR20A3096	Power Systems Analysis Lab (PSA Lab)	GSR/MNSR	G. Sandhya Rani/ M. N. Sandhya Rani	Preparation
GR20A3097	Sensors Measurements and Instrumentation Lab (SMI Lab)	Dr PSVD/ Dr. DGP/ UVL	Dr. P. Srividya Devi/ Dr. D. G. Padhan/ U. Vijaya Laxmi	End Semester Examinations (Theory/ Practic / Supplementary
GR20A3141	Mini Project With Seminar (MP Lab)	Dr. PBB/DSR	Dr. B. Phaneendra Babu/ D. Srinivasa Rao	Commencement ofIV B. Tech I Sem A.Y 20
GR22V8001	Power Electronics for E-Mobility	Dr. PB	Dr. B. Pakkiraiah	

Time Table Coordinator **HOD** **DAA**

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Electrical and Electronics Engineering

2022 -23 II sem Subject Allocation Sheet

II YEAR(GR20)	Section-A
Probability and Statistics	Mr. S Bhagat Kumar
AC Machines	Dr Phaneendra Babu B / G Sandhya Rani
Control Systems	V Usha Rani
Principles of Digital Electronics	Dr T Suresh Kumar

Department of Electrical & Electronics Engineering

Power Distribution and Protection	Dr V Vijaya Rama Raju	
Environmental Science	Dr K Kalpana	
Data Base for Engineers	G Satish	
Principles of Digital Electronics Lab	R Anil Kumar/ MNSandhya Rani	
AC Machines Lab	Dr V Vijaya Rama Raju / M Rekha	
Control Systems Lab	D Karuna Kumar /V Usha Rani	
III YEAR (GR20)	Section-A	
Programmab le Logic Controllers	P Prashanth Kumar	
Sensors Measuremen ts and Instrumentat ion	Dr P Srividyadevi	
Economics and Accounting for Engineers	K Sunil Kumar	
Modern Power Electronics (EEE) (PE-II)	Dr Pakkiraiah	
HVDC Transmission Systems (EEE) (PE-II)	Dr J Sridevi	
NPTEL (OE-II)	D Srinivasa Rao	
Power System Analysis Lab	GSR/MNSR	
Sensors Measuremen ts and Instrumentat ion Lab	Dr P Srividyadevi/ Dr DG Padhan /U Vijaya Lakshmi	
Mini Project with Seminar	Dr Phaneendra Babu B / D Srinvasa Rao	
IV YEAR (GR18)	Section-A	Section-B
Programmable Logic Controllers	Dr Pakkiraiah B	Dr Pakkiraiah B
Power Quality and FACTS (PE-V)	DKK	DKK
Electric Smart Grid (PE-VI)	Dr J Sridevi	Dr J Sridevi
Open Elective III	Complete	
Project work (Phase- II)	AVK/MNSR/GSR	AVK/MNSR/GSR
M.Tech (POWER ELECTRONICS) I-II SEM		
Electric Drives System	Dr A Vinay Kumar	
Modern and Digital Controlof Power Electronic and Drive Systems	Dr.D G Padhan	
Advanced Power Electronic Converters (PE-III)	Dr T Suresh Kumar	
AI and Machine LearningTechniques for Power Electronic Applications (PE-IV)	Dr B Phaneendra Babu	
Electrical Drives Lab	Syed Sarfaraz Nawaz	
DSP and MicrocontrollerLab	Dr A Vinay Kumar	
Mini Project	G Sandhya Rani	
(Audit Course II) Indian Constitution	Syed Sarfaraz Nawaz	
M.Tech (POWER ELECTRONICS) II-II SEM		
Disseration Phase -II	Dr T Suresh Kumar	

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics Engineering

Staff Name	Theory	Labs
K Sudha	2	1
P Praveen Kumar	2	1
Dr D S N M Rao	2	1
P Prashanth Kumar	_____	2
P Ravikanth	1	2
R Anil Kumar	1	_____
M Rekha	_____	3
U Vijaya Lakshmi	_____	4
M Prashanth	_____	3
Dr D G Padhan	1	_____
V Usha Rani	_____	1
CIVIL B.Tech II Year BEEE		
BEEE (CIVIL)	M Prashanth	

Dr Phaneendra Babu B
HOD,EEE

Syllabus – Modern Power Electronics: Syllabus

UNIT I

Modern power semiconductor devices: Modern power semiconductor devices- MOS turn Off Thyristor (MTO)- Emitter Turn Off Thyristor (ETO) Integrated Gate- Commutated Thyristor (IGCTs)-MOS-controlled Thyristors (MCTs)-Static Induction circuit comparison of their features.

UNITII

Resonant Pulse Inverters: Resonant pulse inverters-series resonant inverters-series resonant inverters with unidirectional switches- series resonant inverters with bidirectional Switches-analysis of half bridge resonant inverter - evaluation of currents and Voltages of a simple resonant inverter-analysis of half bridge and full bridge resonant inverter with bidirectional switches.

UNIT III

Multi-level Inverters: Multi level concept-Classification of multilevel inverters- Diode clamped multilevel inverter- principle of operation-main features- improved diode Clamped inverter-principle of operation-Flying capacitors multi-level inverter- principle of operation-main features.

UNIT IV

DC Power Supplies: DC power supplies-classification-switched mode dc power supplies-fly back Converter -forward converter- push pull converter-half bridge converter-Full bridge converter-Resonant dc power supplies-bidirectional dc power supplies-Applications.

UNITV

AC Power Supplies: AC power supplies classification-switched mode ac power supplies-Resonant AC power supplies-bi directional ac power supplies-multi stage conversions-control circuits-applications.

Power Conditioners and Uninterruptible Power Supplies

Introduction-power line disturbances-power conditioners-uninterruptible Power supplies-applications.

TEXT BOOKS:

1 Power Electronics—Mohammed H.Rashid Pearson Education—Third Edition

2. Power Electronics—Ned Mohan, Tore M.Undeland and William P. Robbins
—John Wiley and Sons Second Edition.

Program Educational Objectives (B.Tech. – EEE)

Graduates will be able to

PEO 1: Have a successful technical or professional careers, including supportive and leadership roles on multidisciplinary teams.

PEO 2: Acquire, use and develop skills as required for effective professional practices.

PEO 3: Able to attain holistic education that is an essential prerequisite for being a responsible member of society.

PEO 4: Engage in life-long learning, to remain abreast in their profession and be leaders in our technologically vibrant society.

Program Outcomes (B.Tech. – EEE)

At the end of the Program, a graduate will have the ability to

PO 1: Apply knowledge of mathematics, science, and engineering.

PO 2: Design and conduct experiments, as well as to analyze and interpret data.

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PO 4: Function on multi-disciplinary teams.

PO 5: Identify, formulates, and solves engineering problems.

PO 6: Understanding of professional and ethical responsibility.

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PO 10: Knowledge of contemporary issues.

PO 11: Utilize experimental, statistical and computational methods and tools necessary for engineering practice.

PO 12: Demonstrate an ability to design electrical and electronic circuits, power electronics, power systems; electrical machines analyze and interpret data and also an ability to design digital and analog systems and programming them.

Course Objectives:

At the end of the course the student is expected to:

1. Learn the analysis of single and three phase ac voltage controllers and cycloconverters.
2. Find out the different circuit evaluation parameters in single and three phase inverter circuits for practical design.
3. Learn design of controllers for dc-dc converters in voltage and peak current mode.
4. Know the different pf improvement techniques in single and three phase converters.

Course Outcomes:

1. Define the advances in power electronic devices.
2. Articulate power electronic resonant converters in power control applications.
3. Evaluate the design and control of multi-level inverters.
4. Articulate DC power supplies in Power electronc applications
5. Evaluate the design and control of AC power supplies and uninterruptable power supplies

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

COURSE OBJECTIVES

Academic **Y**ear : 2022-2023

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

On completion of this Subject/Course the student shall be able to:

S. No	Objectives
1	Learn the analysis of single and three phase ac voltage controllers and cycloconverters
2	Find out the different circuit evaluation parameters in single and three phase inverter circuits for practical design
3	Learn design of controllers for dc-dc converters in voltage and peak current mode
4	Know the different pf improvement techniques in single and three phase converters

Signature of HOD Signature of faculty

Date: Date:

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

COURSE OUTCOMES

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

The expected outcomes of the Course/Subject are:

S.No	Outcomes
1	Define the advances in power electronic devices
2	Articulate power electronic resonant converters in power control applications
3	Evaluate the design and control of multi-level inverters.
4	Articulate DC power supplies in Power electronc applications
5	Evaluate the design and control of AC power supplies and uninterruptable power supplies

Signature of HOD Signature of faculty

Date: Date:

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the outcomes.

MISSION OF THE INSTITUTE:
To be among the best of the institutions for engineers and technologists with attitudes, skill and knowledge and to become an epicenter of creative solutions.

VISION OF THE INSTITUTE:
To achieve and impart quality education with an emphasis on practical skills and social relevance.

MISSION OF THE PROGRAM:
To provide the technical knowledge and soft skills required to succeed in life, career and help society to achieve self sufficiency.

Program Educational Objectives:

This education is meant to prepare our students to thrive and to lead. In their careers, our graduates:

1. Will have successful technical or professional careers, including supportive and leadership roles on multidisciplinary teams.
2. Will acquire, use and develop skills required for effective professional practices.
3. Will acquire the holistic education necessary to be a responsible member of society.
4. Engage in life-long learning to remain current in their profession and be leaders in our technological society.

Programme Learning Outcomes:

Students in the Electronics and Communication Engineering program should, at the time of their graduation, be in possession of:

a. Ability to apply knowledge of mathematics, science, and engineering.
b. Ability to design and conduct experiments, as well as to analyze and interpret data.
c. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d. Ability to function on multi-disciplinary teams.
e. Ability to identify, formulate, and solve engineering problems.
f. Understanding of professional and ethical responsibility.
g. Ability to communicate effectively.
h. Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
i. Recognition of the need for, and an ability to engage in life-long learning.
j. Knowledge of contemporary issues.
k. Ability to utilize experimental, statistical and computational methods and tools necessary for engineering practice.
l. Graduates will demonstrate an ability to design electrical and electronic circuits, power electronics, power systems, electrical machines analyze and interpret data and also an ability to design digital and analog systems and programming them.

Assessment methods:

1. Regular Attendance to Classes.
2. Mid Exam / Main Exam.
3. Written class tests clearly linked to learning objectives
4. Classroom assessment techniques via. Tutorials and assignments.
5. Seminars.

1. Program Educational Objectives (PEOs) – Vision/Mission Matrix

(Indicate the relationships by mark "X")

Vision / Mission / PEOs	Vision of the Institute	Mission of the Institute	Mission of the Program
1	X		X
2	X	X	X
3	X	X	X
4		X	X

2. Program Educational Objectives(PEOs)-Program Outcomes(POs) Relationship Matrix

(Indicate the relationships by mark "X")

P-Outcomes / PEOs	a	b	c	d	e	f	g	h	i	j	k	l
1	X	X	X	X	X			X	X	X	X	X
2	X	X	X	X	X			X	X	X	X	X
3		X	X	X		X	X	X	X	X		
4				X					X	X		X

3. Course Objectives-Course Outcomes Relationship Matrix

(Indicate the relationships by mark "X")

Course-Outcomes / Course-Objectives	1	2	3	4	5	6	7
1	X		X			X	
2		X		X			
3			X		X		
4	X		X				X

4. Course Objectives-Program Outcomes (POs) Relationship Matrix

(Indicate the relationships by mark "X")

P-Outcomes / C-Objectives	a	b	c	d	e	f	g	h	i	j	k	l
1	X		X		X	X	X	X	X	X	X	
2	X	X	X		X	X	X	X			X	X
3	X	X	X		X	X	X	X	X		X	X
4	X	X		X	X		X	X		X	X	X

5. Course Outcomes-Program Outcomes (POs) Relationship Matrix

(Indicate the relationships by mark "X")

P-Outcomes / C-Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
1	X				X	X	X	X	X		X	X
2	X	X	X	X	X		X	X	X		X	X
3	X	X		X	X		X	X	X	X	X	X
4		X	X				X			X		X
5			X		X		X		X			
6		X			X						X	X
7	X				X		X		X		X	

6. Courses (with title & code)-Program Outcomes (POs) Relationship Matrix

(Indicate the relationships by mark "X")

P-Outcomes	a	b	c	d	e	f	g	h	i	j	k	l

Courses												
Analysis of Power Electronics Converters (GR17D5037)	X	X	X	X	X	X	X	X	X	X	X	X

7. Program Educational Objectives (PEOs)-Course Outcomes Relationship Matrix
(Indicate the relationships by mark "X")

P-Objectives (PEOs) / Course-Outcomes	1	2	3	4
1		X	X	X
2	X	X	X	X
3	X	X	X	X
4		X	X	X
5		X	X	X
6	X	X	X	X
7		X	X	X

8. Assignments & Assessments-Program Outcomes (POs) Relationship Matrix
(Indicate the relationships by mark "X")

P-Outcomes / Assessments	a	b	c	d	e	f	g	h	i	j	k	l
1	X			X	X	X	X	X	X	X		
2	X	X			X		X	X	X	X		
3	X				X	X			X			
4	X			X	X	X		X	X	X		X
5	X	X		X			X		X		X	

9. Assignments & Assessments-Program Educational Objectives (PEOs) Relationship Matrix (Indicate the relationships by mark "X")

P-Objectives (PEOs) / Assessments	1	2	3	4
1		X	X	X
2	X	X	X	X
3	X	X		X
4		X		X
5	X	X	X	X

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

GUIDELINES TO STUDY THE COURSE / SUBJECT

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Guidelines to study the Course/ Subject: MODERN POWER ELECTRONICS

Course Design and Delivery System (CDD):

- The Course syllabus is written into number of learning objectives and outcomes.
- These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars, presentations, etc.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Understand the principles of Learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD Signature of faculty

Date: Date:

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

COURSE SCHEDULE

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

The Schedule for the whole Course / Subject is:

S. No.	Description	Duration (Date)		Total No. Of Periods
		From	To	
1.	Unit-1			9
2.	Unit-2			14
3.	Unit-3			12
4..	Unit-4			10
5.	Unit-5			9

Total No. of Instructional periods available for the course:.....Hours / Periods

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

ILLUSTRATIVE VERBS FOR STATING INSTRUCTIONAL OBJECTIVES

These verbs can also be used while framing questions for Continuous Assessment Examinations as well as for End – Semester (final)Examinations

ILLUSTRATIVE VERBS FOR STATING GENERAL OBJECTIVES/OUTCOMES

Know Comprehend	Understand Apply	Analyze Design	Generate Evaluate

ILLUSTRATIVE VERBS FOR STATING SPECIFIC OBJECTIVES/OUTCOMES:

A. COGNITIVE DOMAIN (KNOWLEDGE)

1	2	3	4	5	6
Knowledge	Comprehension Understanding	Application of knowledge & comprehension	Analysis Of whole w .r.t. its constituents	Synthesis	Evaluation Judgment
Define	Convert	Change	Breakdown	Categorize	Appraise
Identify	Defend	Compute	Differentiate	Combine	Compare
Label	Describe (a	Demonstrate	Discriminate	Compose	Conclude
List	Procedure)	Deduce	Distinguish	Compose	Contrast
March	Distinguish	Manipulate	Separate	Create	Criticize
Reproduce	Estimate	Modify	Subdivide	Devise	Justify
Select	Explain why/how	Predict		Design	Interpret
State	Extend	Prepare		Generate	Support
	Generalize	Relate		Organize	
	Give examples	Show		Plan	
	Illustrate	Solve		Rearrange	
	Infer			Reconstruct	
	Summarize			Reorganize	
				Revise	

B. AFFECTIVE DOMAIN (ATTITUDE)		C. PSYCHOMOTOR DOMAIN (SKILLS)				
Adhere	Resolve	Bend	Dissect	Insert	Perform	Straighten
Assist	Select	Calibrate	Draw	Keep	Prepare	Strengthen
Attend	Serve	Compress	Extend	Elongate	Remove	Time
Change	Share	Conduct	Feed	Limit	Replace	Transfer
Develop		Connect	File	Manipulate	Report	Type
Help		Convert	Grow	Move Precisely	Reset	Weigh
Influence		Decrease	Increase	Paint	Set	

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

SCHEDULE OF INSTRUCTIONS
COURSE PLAN

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Unit No.	Lesson No.	Date	No. of Periods	Topics / Sub-Topics	Objectives & Outcomes Nos.	References (Text Book, Journal…) Page Nos.:____to
I	1.		1	MOS turn Off Thyristor (MTO)	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	2.		1	Emitter Turn Off Thyristor (ETO)	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	3.		1	Integrated Gate- Commutated Thyristor (IGCTs)-	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	4.		1	MOS-controlled Thyristors (MCTs)	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid -Third Edition
	5.		1	Static Induction circuit comparison of their features.	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
II	1.		1	series resonant inverters with unidirectional switches	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	2.		1	series resonant inverters with bidirectional Switches	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	3.		1	analysis of half bridge resonant inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition

	4.		1	evaluation of currents and Voltages of a simple resonant inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	5		1	analysis of half bridge and full bridge resonant inverter with bidirectional switches -	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	6		1	Frequency response of series resonant inverters- for series loaded inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	7			for parallel loaded inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	8		1	for series and parallel loaded inverters-	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	9		1	parallel resonant inverters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	10		1	Voltage control of resonant inverters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	11		1	class E inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	12		1	Class E rectifier	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	13		1	Numerical problems.	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	14		1	Zero current switching resonant converters-L type ZCS resonant converter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	15		1	M type ZCS resonant converter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	16		1	-zero voltage Switching resonant converters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	17		1	comparison between ZCS and ZVS resonant converters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	18		1	Two quadrant ZVS resonant converters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition

	19		1	resonant dc-link Inverters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
	20		1	evaluation of L and C for a zero current switching inverter Numerical problems.	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
III	1			Multi level concept- Classification of multilevel inverters	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	2		1	Diode clamped multilevel inverter- principle of operation-main features	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	3		1	improved diode Clamped inverter- principle of operation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition .
	4			Flying capacitors multi level inverter principle of operation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	5		1	main features of FCMLI	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	6		1	Cascaded multi level inverter principle of operation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	7		1	main features-modulation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	8		1	Multilevel inverter applications-reactive power compensation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	9		1	-back to back intertie system	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	10		1	adjustable speed drives	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	11		1	Switching device currents- dc link capacitor voltage balancing -	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	12		1	features of Multi level inverters-	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
	13		1	comparisons of multi level converters	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
IV	1		1	**:** DC power supplies- classification-switched mode dc power supplies-fly back Converter	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition

	2		1	Numerical problems	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	3		1	forward converter- push pull converter	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	4		1	half bridge converter	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	5		1	-Full bridge converter-	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	6		1	Resonant dc power supplies-bidirectional dc power supplies-Applications.	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
V	1		1	AC power supplies classification-switched mode ac power supplies	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	2		1	Resonant AC powersupplies-bi directional ac power supplies	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	3		1	-multi stage conversions-control circuits-applications	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	4		1	Introduction-powerline disturbances-power conditioners-.	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
	5		1	uninterruptible Power supplies-applications	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition

Signature of HOD

Signature of faculty

Date:

Date:

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3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	References (Text Book, Journal…) Page Nos.:____to _____
1.		1	MOS turn Off Thyristor (MTO)	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
2.		1	Emitter Turn Off Thyristor (ETO)	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
3.		1	Integrated Gate- Commutated Thyristor (IGCTs)-	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
4.		1	MOS-controlled Thyristors (MCTs)	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid - Third Edition
5.		1	Static Induction circuit comparison of their features.	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition

Signature of HOD Signature of faculty

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SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

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Lesson No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	References (Text Book, Journal…) Page Nos.:____to
1.		1	series resonant inverters with unidirectional switches	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
2.		1	series resonant inverters with bidirectional Switches	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
3.		1	analysis of half bridge resonant inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
4.		1	evaluation of currents and Voltages of a simple resonant inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
5		1	analysis of half bridge and full bridge resonant inverter with bidirectional switches -	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
6		1	Frequency response of series resonant inverters-for series loaded inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
7			for parallel loaded inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
8		1	for series and parallel loaded inverters-	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition

9		1	parallel resonant inverters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
10		1	Voltage control of resonant inverters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
11		1	class E inverter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
12		1	Class E rectifier	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
13		1	Numerical problems.	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
14		1	Zero current switching resonant converters-L type ZCS resonant converter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
15		1	M type ZCS resonant converter	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
16		1	-zero voltage Switching resonant converters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
17		1	comparison between ZCS and ZVS resonant converters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
18		1	Two quadrant ZVS resonant converters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
19		1	resonant dc-link Inverters	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition
20		1	Evaluation of L and C for a zero current switching inverter Numerical problems.	2,3 & 1,3,5	Power Electronics - Mohammed H. Rashid Third Edition

Signature of HOD

Signature of faculty

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Date:

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093 Name

of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No.	Date	No. of Perio	Topics / Sub - Topics	Objectives & Outcomes Nos.	References (Text Book, Journal…) Page Nos.:____to _____
1			Multi level concept-Classification of multilevel inverters	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
2		1	Diode clamped multilevel inverter- principle of operation-main features	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
3		1	improved diode Clamped inverter-principle of operation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition .
4			Flying capacitors multi level inverter principle of operation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
5		1	main features of FCMLI	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
6		1	Cascaded multi level inverter principle of operation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
7		1	main features-modulation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition

8		1	Multilevel inverter applications-reactive power compensation	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
9		1	-back to back intertie system	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
10		1	adjustable speed drives	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
11		1	Switching device currents-dc link capacitor voltage balancing -	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
12		1	features of Multi level inverters-	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition
13		1	comparisons of multi level converters	1,3 & 2,4	Power Electronics - Mohammed H. Rashid Third Edition

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Date:

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

Date: Date:

SCHEDULE OF INSTRUCTIONSUNIT PLAN

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093 Name

of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	References (Text Book, Journal…) Page Nos.:____to _____
1		1	**:** DC power supplies-classification-switched mode dc power supplies-fly back Converter	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
2		1	Numerical problems	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
3		1	forward converter- push pull converter	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
4		1	half bridge converter	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
5		1	-Full bridge converter-	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
6		1	Resonant dc power supplies-bidirectional dc power supplies-Applications.	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

Date: Date:

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic **Y**ear : 2022-23

Semester : II

Name of the Program: B.Tech (EEE) Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	References (Text Book, Journal…) Page Nos.:____to _____
1		1	AC power supplies classification-switched mode ac power supplies	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
2		1	Resonant AC power supplies-bi directional ac power supplies	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
3		1	-multi stage conversions-control circuits-applications	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
4		1	Introduction-powerline disturbances-power conditioners- .	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition
5		1	uninterruptible Power supplies-applications	3,4 & 4,6,7	Power Electronics - Mohammed H. Rashid Third Edition

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Signature of faculty

Date: Date:

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3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** I
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 01 **Duration of Lesson:** 2hr

Lesson Title: MOS turn Off Thyristor (MTO)

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of MTO turn on & turn off characteristics.

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

MTO turn on and turn off characteristics.

Assignment / Questions:
1. Explain about MTO turn on and turn off characteristics.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2, 3 & 1, 3, 5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** I
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
Lesson No: 02 **Duration of Lesson:** 2hr

Lesson Title: Emitter Turn off Thyristor (ETO)
INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Emitter Turn off Thyristor (ETO)

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS :

Emitter Turn off Thyristor (ETO) turn on and turn off characteristics

Assignment / Questions:
1. Explain about Emitter Turn Off Thyristor (ETO) turn on and turn off characteristics

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos: 2,3 & 1, 3,

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** I
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 03 **Duration of Lesson:** 2hr

Lesson Title: Integrated Gate- Commutated Thyristor (IGCTs)
INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Integrated Gate- Commutated Thyristor (IGCTs)
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Integrated Gate- Commutated Thyristor (IGCTs) turn on turn off characteristics

Assignment / Questions:
1. Explain Integrated Gate- Commutated Thyristor (IGCTs) turn on & turn off characteristics

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos: 2, 3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** I
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 04 **Duration of Lesson:**2hr

Lesson Title: MOS-controlled Thyristors (MCTs)

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Provide the students the fundamental concepts of MOS-controlled Thyristors (MCTs)
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

MOS-controlled Thyristors (MCTs)

Assignment / Questions:
1. Write short notes on MOS-controlled Thyristors (MCTs) with equivalent circuit.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** I
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 05 **Duration of Lesson:**2hr

Lesson Title: Static Induction circuit comparison of their features

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Learn the turn on and turn off of Static Induction circuit, comparison of their features
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

To learn the turn on and turn off of Static Induction circuit, comparison of their features

Assignment / Questions:
1. Explain the turn on and turn off of Static Induction circuit with equivalent circuit.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 01 **Duration of Lesson:2**hr

Lesson Title: Series resonant inverters with unidirectional switches

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Provide the students the fundamental concepts of series resonant inverters with unidirectional switches

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Series resonant inverters with unidirectional switches

Assignment / Questions:

1. Explain Series resonant inverters with unidirectional switches with neat wave forms.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 02 **Duration of Lesson:** 2hr

Lesson Title: Series resonant inverters with bidirectional Switches

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Provide the students the fundamental concepts of series resonant inverters with bidirectional Switches

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Series resonant inverters with bidirectional Switches

Assignment / Questions:

1. Explain Series resonant inverters with bidirectional Switches with waveforms

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 03 **Duration of Lesson:**2hr

Lesson Title: Analysis of half bridge resonant inverter

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
Provide the students the analysis of half bridge resonant inverter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Problems on analysis of half bridge resonant inverter

Assignment / Questions:
1. Calculate the toff, Vpp,load current,max switching frequency, rms current average current of half bridge resonant inverter

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 04 **Duration of Lesson:2**hr
Lesson Title: Evaluation of currents and Voltages of a simple resonant inverter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Provide the students the fundamental concepts of evaluation of currents and Voltages of a simple resonant inverter
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Evaluation of currents and Voltages of a simple resonant inverter

Assignment / Questions:
1. To evaluate currents and Voltages of a simple resonant inverter.

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 05 **Duration of Lesson:**2hr

Lesson Title: Analysis of half bridge and full bridge resonant inverter with bidirectional switches

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Provide the students the fundamental concepts of analysis of half bridge and full bridge resonant inverter with bidirectional switches
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Analysis of half bridge and full bridge resonant inverter with bidirectional switches

Assignment / Questions:
1.Explain the analysis of half bridge and full bridge resonant inverter with bidirectional switches

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 06 **Duration of Lesson:**2hr

Lesson Title: Frequency response of series resonant inverters-for series loaded inverter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Frequency response of series resonant inverters-for series loaded inverter
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Frequency response of series resonant inverters-for series loaded inverter

Assignment / Questions:

1. Explain Frequency response of series resonant inverters-for series loaded inverter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 07 **Duration of Lesson:**2hr

Lesson Title: Frequency response of series resonant inverters-for parallel loaded inverter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Provide the students the fundamental concepts of Frequency response of series resonant inverters-for parallel loaded inverter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top **TEACHING POINTS**:

Frequency response of series resonant inverters-for parallel loaded inverter

Assignment / Questions:

1. Explain Frequency response of series resonant inverters-for parallel loaded inverter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 08 **Duration of Lesson:** 2hr

Lesson Title: Frequency response of series resonant inverters-for series-parallel loaded inverter

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Frequency response of series resonant inverters-for series-parallel loaded inverter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Frequency response of series resonant inverters-for series-parallel loaded inverter

Assignment / Questions:
1. Explain Frequency response of series resonant inverters-for series-parallel loaded inverter

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 09 **Duration of Lesson:**2hr

Lesson Title: Parallel resonant inverters

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of parallel resonant inverters

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Parallel resonant inverters operation

Assignment / Questions:
1. Explain parallel resonant inverters with waveforms

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

.**Lesson No:** 10 **Duration of Lesson:**2hr
Lesson Title: Voltage control of resonant inverters

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Voltage control of resonant inverters

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Voltage control of resonant inverters

Assignment / Questions:
1. Explain Voltage control of resonant inverters

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty:Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 11 **Duration of Lesson:2**hr

Lesson Title: Class E inverter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of class E inverter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Class E inverter operation

Assignment / Questions:
1. Explain the operation of class E Inverter with necessary waveforms

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty:Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
Lesson No: 12 **Duration of Lesson:**2hr

Lesson Title: Class E rectifier

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Provide the students the fundamental concepts of Class E rectifier

TEACHING AIDS: Board, Marker
TEACHING POINTS:

Class E rectifier operation

Assignment / Questions:
1. Explain the operation of class E rectifier with necessary waveforms

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 13 **Duration of Lesson:** 2hr

Lesson Title: Numerical problems on resonant pulse inverters

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To learn Numerical problems on resonant pulse inverters

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Numerical problems on resonant pulse inverters

Assignment / Questions:

1. The full bridge resonant inverter is operated at a frequency f0 =3.5 KHz.
If C = 6μF, L = 50μH, R = 2Ωand Vs= 220V. Determine
i) Peak supply current
ii) Average device current IA
iii) RMS load current.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** II

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 14 **Duration of Lesson:** 2hr

Lesson Title: Zero current switching resonant converters-L type ZCS resonant converter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of Zero current switching resonant converters-L type ZCS resonant converter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Zero current switching resonant converters-L type ZCS resonant converter

Assignment / Questions:

1. Explain the operation of Zero current switching resonant converters-L type ZCS resonant converter

Signature of faculty

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 15 **Duration of Lesson:**2hr

Lesson Title: M type ZCS resonant converter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of M type ZCS resonant converter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

M type ZCS resonant converter

Assignment / Questions:
1. Explain the operation of Zero current switching resonant converters-M type ZCS resonant converter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
Lesson No: 16 **Duration of Lesson:**2hr

Lesson Title: Zero voltage Switching resonant converters

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of zero voltage switching resonant converters

TEACHING POINTS:

Zero voltage Switching resonant converters

Assignment / Questions:

1. Explain the operation of zero voltage Switching resonant converters

Signature of faculty Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
Lesson No: 17 **Duration of Lesson:**2hr

Lesson Title: Comparison between ZCS and ZVS resonant converters

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of comparison between ZCS and ZVS resonant converters
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Comparison between ZCS and ZVS resonant converters

Assignment / Questions:

1. Write Comparisons between ZCS and ZVS resonant converters

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 18 **Duration of Lesson:**2hr

Lesson Title: Two quadrant ZVS resonant converters

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of two quadrant ZVS resonant converters

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Two quadrant ZVS resonant converters operation

Assignment / Questions:

1. Explain the operation of two quadrant ZVS resonant converters

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** II

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 19 **Duration of Lesson:**2hr

Lesson Title: Resonant dc-link Inverters, evaluation of L and C for a zero current switching inverter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of resonant dc-link Inverters, evaluation of L and C for a zero current switching inverter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Resonant dc-link Inverters evaluation of L and C for a zero current switching inverter

Assignment / Questions:

1. Explain resonant dc-link Inverters

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

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LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** II
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 20 **Duration of Lesson:**2hr

Lesson Title: Numerical problems on ZCS and ZVS

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
Solve Numerical problems.

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Numerical problems on ZCS and ZVS

Assignment / Questions:

1. The zero current resonant converter (ZCS) delivers a maximum power Q PL= 400 mw at Vo=4 V. The supply voltage Vs= 15V the maximum operating frequency is fmax = 50 kHz. Determine the values of L and C. Assume that the intervals t1 and t3are very small and x = 1.5.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 2,3 & 1,3,5

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 01 **Duration of Lesson:2**hr

Lesson Title: Multi level concept-Classification of multilevel inverters.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of Multi level concept-Classification of multilevel inverters

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Multi level concept-Classification of multilevel inverters

Assignment / Questions:

1. Explain the Multi level concept. Classify multilevel inverters

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 02 **Duration of Lesson:**2hr

Lesson Title: Diode clamped multilevel inverter- principle of operation-main features
INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Diode clamped multilevel inverter- principle of operation-main features
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Diode clamped multilevel inverter- principle of operation-main features

Assignment / Questions:

1. Explain the principle of operation of Diode clamped multilevel inverter and its main features

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
Lesson No: 03 **Duration of Lesson:**2hr

Lesson Title: Improved diode Clamped inverter-principle of operation
INSTRUCTIONAL/LESSON OBJECTIVES:
1. To provide the students the fundamental concepts of improved diode Clamped inverter-principle of operation
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Improved diode Clamped inverter-principle of operation

Assignment / Questions:

1. Explain the principle of operation of Improved Diode clamped multilevel inverter.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 04 **Duration of Lesson:**2hr

Lesson Title: Flying capacitors multi level inverter principle of operation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of Flying capacitors multi level inverter principle of operation

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Flying capacitors multi level inverter principle of operation

Assignment / Questions:

1. Explain the principle of operation of Flying capacitors multi level inverter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 05 Duration of Lesson:2hr

Lesson Title: Main features of FCMLI

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of main features of FCMLI

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Main features of FCMLI

Assignment / Questions:

1. Explain main features of FCMLI

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** III

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 06 **Duration of Lesson:**2hr

Lesson Title: Cascaded multi level inverter principle of operation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of Cascaded multi level inverter principle of operation

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Cascaded multi level inverter principle of operation

Assignment / Questions:

1. Explain the principle of operation of Cascaded multi level inverter.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** III

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 07 **Duration of Lesson:**2hr

Lesson Title: Main features-modulation of H bridge Inverters

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of Main features-modulation of H bridge Inverters

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Main features-modulation of H bridge Inverters

Assignment / Questions:

1.Explain the Main features of H bridge Inverters

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** III

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 08 **Duration of Lesson:**2hr

Lesson Title: Multilevel inverter applications-reactive power compensation

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of multilevel inverter applications-reactive power compensation

TEACHING AIDS: Board, Marker

TEACHING POINTS:

Multilevel inverter applications-reactive power compensation

Assignment / Questions:

1.Write Multilevel inverter applications

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
Lesson No: 09 **Duration of Lesson:**2hr

Lesson Title: back to back intertie system

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of back to back intertie system
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top **TEACHING POINTS**:

back to back intertie system

Assignment / Questions:
1. Explain back to back intertie system

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 10 **Duration of Lesson:**2hr

Lesson Title: Adjustable speed drives

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of adjustable speed drives
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Adjustable speed drives

Assignment / Questions:
1.Write short notes on adjustable speed drives

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 11 **Duration of Lesson:**2hr

Lesson Title: Switching device currents-dc link capacitor voltage balancing

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Switching device currents-dc link capacitor voltage balancing
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Switching device currents-dc link capacitor voltage balancing

Assignment / Questions:
1. Explain Switching device currents-dc link capacitor voltage balancing

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 12 **Duration of Lesson:2**hr

Lesson Title: Features of Multi level inverters

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of features of Multi level inverters
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top **TEACHING POINTS**:

Features of Multi level inverters

Assignment / Questions:
1. Explain features of Multi level inverters

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** III
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 13 **Duration of Lesson:2**hr

Lesson Title: Comparisons of multi level converters

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of comparisons of multi level converters
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Comparisons of multi level converters

Assignment / Questions:
1.Write comparisons of multi level converters

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 1,3 & 2,4

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** IV
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 01 **Duration of Lesson:**2hr

Lesson Title: DC power supplies-classification-switched mode dc power supplies-fly back Converter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of DC power supplies-classification-switched mode dc power supplies-fly back Converter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top **TEACHING POINTS**:

DC power supplies-classification-switched mode dc power supplies-fly back Converter

Assignment / Questions:

1. Explain DC power supplies and operation of fly back Converter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** IV

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 02 **Duration of Lesson:2**hr

Lesson Title: Forward converter- push pull converter

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of forward converter- push pull converter

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Forward converter- push pull converter

Assignment / Questions:

1. Explain the operations of forward converter and push pull converter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

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LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** IV
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 03 **Duration of Lesson:**2hr

Lesson Title: Half bridge converter

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of half bridge converter
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Half bridge converter

Assignment / Questions:
1. Explain the operation of half bridge converter

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes No; 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** IV
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 04 **Duration of Lesson:**2hr

Lesson Title: Full bridge converter

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of Full bridge converter
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Full bridge converter

Assignment / Questions:

1. Explain the operation of Full bridge converter

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** IV
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 05 **Duration of Lesson:**2hr

Lesson Title: Resonant dc power supplies

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of resonant dc power supplies
TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Resonant dc power supplies

Assignment / Questions:

1. Explain Resonant dc power supplies

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** IV
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 06 **Duration of Lesson:**2hr

Lesson Title: Bidirectional dc power supplies-Applications.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of bidirectional dc power supplies-Applications.

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Bidirectional dc power supplies-Applications.

Assignment / Questions:

1. Explain bidirectional dc power supplies.Write Applications of power supplies.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** V

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 01 **Duration of Lesson:2**hr

Lesson Title: AC power supplies classification-switched mode ac power supplies

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of AC power supplies classification-switched mode ac power supplies

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

AC power supplies classification-switched mode ac power supplies

Assignment / Questions:

1. Explain switched mode ac power supplies

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** V

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 02 **Duration of Lesson:**2hr

Lesson Title: Resonant AC power supplies-bi directional ac power supplies

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of Resonant AC power supplies-bi directional ac power supplies.

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top

TEACHING POINTS:

Resonant AC power supplies-bi directional ac power supplies.

Assignment / Questions:

1. Explain Resonant AC power supplies and bi directional ac power supplies

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23

Semester: II **UNIT NO:** V

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 03 **Duration of Lesson:**2hr

Lesson Title: Multi stage conversions-control circuits-applications.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of multi stage conversions-control circuits-applications.

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top **TEACHING POINTS**:

Multi stage conversions-control circuits-applications.

Assignment / Questions:

1. Explain multi stage conversions, control circuits and applications of Ac power supplies.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** V
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 04 **Duration of Lesson:**2hr

Lesson Title: Power line disturbances-power conditioners

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. To provide the students the fundamental concepts of power line disturbances-power conditioners

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Power line disturbances-power conditioners

Assignment / Questions:
1. Explain power line disturbances-power conditioners

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

LESSON PLAN

Academic Year: 2022-23
Semester: II **UNIT NO:** V
Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

Lesson No: 05 **Duration of Lesson:**2hr

Lesson Title: Uninterruptible Power supplies-applications

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:

1. To provide the students the fundamental concepts of uninterruptible Power supplies-applications.

TEACHING AIDS: Board, Marker, Duster, LCD Projector, Slides in Lap-Top
TEACHING POINTS:

Uninterruptible Power supplies-applications

Assignment / Questions:
1. Explain the operation of On Line, Off Line UPS and its applications.

Signature of faculty
Note: Mention for each question the relevant Objectives and Outcomes Nos. 3,4 & 4,6,7

ASSIGNMENT SHEET –1

Academic Year: 2022-23
Semester: II **UNIT NO: I**

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE
Designation: Associate Professor

This Assignment corresponds to Unit No. / Lesson 01
Q1. Explain the turn-on and turn-off operation of MTO with its equivalent circuit
Q2. What is MOS controlled thyristor? Draw and explain its schematic and equivalent circuit for p-channel MCT'S.
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.: 2, 3
Outcome Nos.: 1, 3,5

Signature of HOD Signature of faculty

Date: Date:

ASSIGNMENT SHEET –2

Academic Year: 2022-23
Semester: II **UNIT NO: II**

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

This Assignment corresponds to Unit No. / Lesson 02
Q1. Explain the operation of Class E resonant Rectifier with waveforms
Q2. Explain the operation of Two Quadrant ZVS resonant Converter with waveforms
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.: 2,3
Outcome Nos.: 1,3,5

Signature of HOD
Date:

Signature of faculty
Date:

ASSIGNMENT SHEET –3

Academic Year: 2022-23
Semester: II **UNIT NO: III**

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

This Assignment corresponds to Unit No. / Lesson 03
Q1. Explain the dc link capacitor voltage balances in multilevel inverter. What are the advantages of flying capacitor multilevel inverters?
Q2. What are the features of Multi level inverter?
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 1,3
Outcome Nos.: 2,4

Signature of HOD
Date:

Signature of faculty
Date:

ASSIGNMENT SHEET –4

Academic Year: 2022-23
Semester: II **UNIT NO: IV**

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

This Assignment corresponds to Unit No. / Lesson 04

Q1. Explain the working of Forward converter under discontinuous mode of operation for DC to AC conversion employed in SMPS

Q2. Explain the various modes of operation of Half-Bridge converter using a neat circuit diagram and also mention the advantages and disadvantages of Half Bridge converter.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 3,4

Outcome Nos.: 4,6,7

Signature of HOD
Date:

Signature of faculty
Date:

Academic Year: 2022-23
Semester: II **UNIT NO: V**

Name of the Program: B.Tech Year: III Section: A

Course/Subject: Modern Power Electronics Course Code: GR20A3093

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor
This Assignment corresponds to Unit No. / Lesson 05
Q1. Draw neat circuit diagram of Resonant AC power supplies.
What is the general arrangement of UPS system?
Q2. Write short notes on the following.
a) Power line Disturbances
b) Power conditioners.
c) On line UPS
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.: 3,4 Outcome Nos.: 4,6,7
Signature of HOD Signature of faculty

Date: Date:

TUTORIAL SHEET - 1

Academic Year: 2022-23
Semester: II **UNIT NO:** I
Name of the Program: B.Tech **Year:** III. **Section:** A
Course/Subject: Modern Power Electronics Course Code: GR18A4074

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

This Tutorial corresponds to Unit No/ Lesson: 01
Q1.What are the advantages and disadvantages of ETOs?
Q2. Explain the turn-on and turn-off operation of Integrated Gate commutated thyristor with its equivalent circuit.
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.:2,3
Outcome Nos.:1, 3, 5

Signature of HOD Signature of faculty

Date: Date:

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical & Electronics

TUTORIAL SHEET - 2

Academic Year: 2022-23
Semester: II **UNIT NO: I**I
Name of the Program: B.Tech **Year:** III. **Section:** A
Course/Subject: Modern Power Electronics Course Code: GR18A4074

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

This Tutorial corresponds to UnitNo/ Lesson: 02

Q1. The full bridge resonant inverter is operated at a frequency f0 =3.5 KHz. If C = 6μF, L = 50μH, R = 2Ωand Vs= 220V. Determine

i) Peak supply current
ii) Average device current IA
iii) RMS load current.

Q2. The zero current resonant converter (ZCS) delivers a maximum power Q PL= 400 mw at Vo=4 V. The supply voltage Vs= 15V the maximum operating frequency is fmax = 50 kHz. Determine the values of L and C. Assume that the intervals t1 and t3are very small and x = 1.5.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.:2,3
Outcome Nos.:1,3,5

Signature of HOD Signature of faculty

Date: Date:

Academic Year: 2022-23
Semester: II **UNIT NO: III**
Name of the Program: B.Tech **Year:** III. **Section:** A
Course/Subject: Modern Power Electronics Course Code: GR18A4074

Name of the Faculty: Dr Pakkiraiah B Dept: EEE

Designation: Associate Professor

This Tutorial corresponds to UnitNo/ Lesson: 03

Q1. A single phase diode clamped inverter has m=5.Find the peak voltage and current ratings of diodes and switches if Vdc=5kv and io=50 sin (θ-60)

Q2. . A single phase cascaded multilevel inverter has m=5.Find the peak voltage and average and rms current ratings of diodes and switches if Vdc=1kv and io=150 sin (θ-30)
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.:1,3
Outcome Nos.:2,4

Signature of HOD Signature of faculty

Date: Date:

TUTORIAL SHEET - 4

Academic Year: 2022-23
Semester: II **UNIT NO: IV**
Name of the Program: B.Tech **Year:** III. **Section:** A
Course/Subject: Modern Power Electronics Course Code: GR18A4074
Name of the Faculty: Dr Pakkiraiah B Dept: EEE
Designation: Associate Professor

This Tutorial corresponds to UnitNo/ Lesson: 04
Q1. The average output voltage of the Push-Pull circuit is Vo=24V at a resistance load of R=0.8ohms. The ON-state voltage drop of transistors and diodes are V1=1.2V, and Vd=0.7V respectively. The turns ratio of the transformer is 'a'= Ns/Np=0.25. Find
i) The avg input current(Is) ii) The efficieny
iii) The avg Transistor current(Ia) iv) The Peak transistor current(Ip)
v) The open ciruit voltage(Voc).Neglect losses in a transformer and the ripple current of the load and input supply are negligible. Assume Duty cycle K=0.5.
Q2.. The average output voltage of the Flyback circuit is Vo=24V at a resistance load of R=1ohm. The ON-state voltage drop of transistors and diodes are V1=1.2V, and Vd=0.7V respectively. The turns ratio of the transformer is 'a'= Ns/Np=0.25. Find i) The avg input current(Is) ii) The efficieny iii) The avg Transistor current(Ia)iv) The Peak transistor current(Ip) v) The open ciruit voltage(Voc)
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.:3,4 Outcome Nos.:4,6,7

Signature of HOD Signature of faculty

Date: Date:

TUTORIAL SHEET - 5

Academic Year: 2022-23
Semester: II **UNIT NO:** V
Name of the Program: B.Tech **Year:** III. **Section:** A
Course/Subject: Modern Power Electronics Course Code: GR18A4074
Name of the Faculty: Dr Pakkiraiah B Dept: EEE
Designation: Associate Professor

This Tutorial corresponds to UnitNo/ Lesson: 05
Q1. Explain the two commonly used control methods for power supplies.Q2.
What are the applications of bidirectional power supplies?
Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.
Objective Nos.:3,4
Outcome Nos.:4,6,7

Signature of HOD Signature of faculty

Date: Date:

Course Design and Delivery System (CDD):

- The Course syllabus is written into number of learning objectives and outcomes.
- These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars, presentations, etc.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

Understand the principles of Learning

Understand the psychology of students

Develop instructional objectives for a given topic

Prepare course, unit and lesson plans

Understand different methods of teaching and learning

Use appropriate teaching and learning aids

Plan and deliver lectures effectively Provide feedback to students using various methods of Assessments and tools of Evaluation

Act as a guide, adviser, counselor, facilitator, and motivator and not just as a teacheralone

Signature of HOD
Date:

Signature of faculty
Date:

Total No. of Instructional periods available for the course 64 Periods

Signature of HOD

Date:

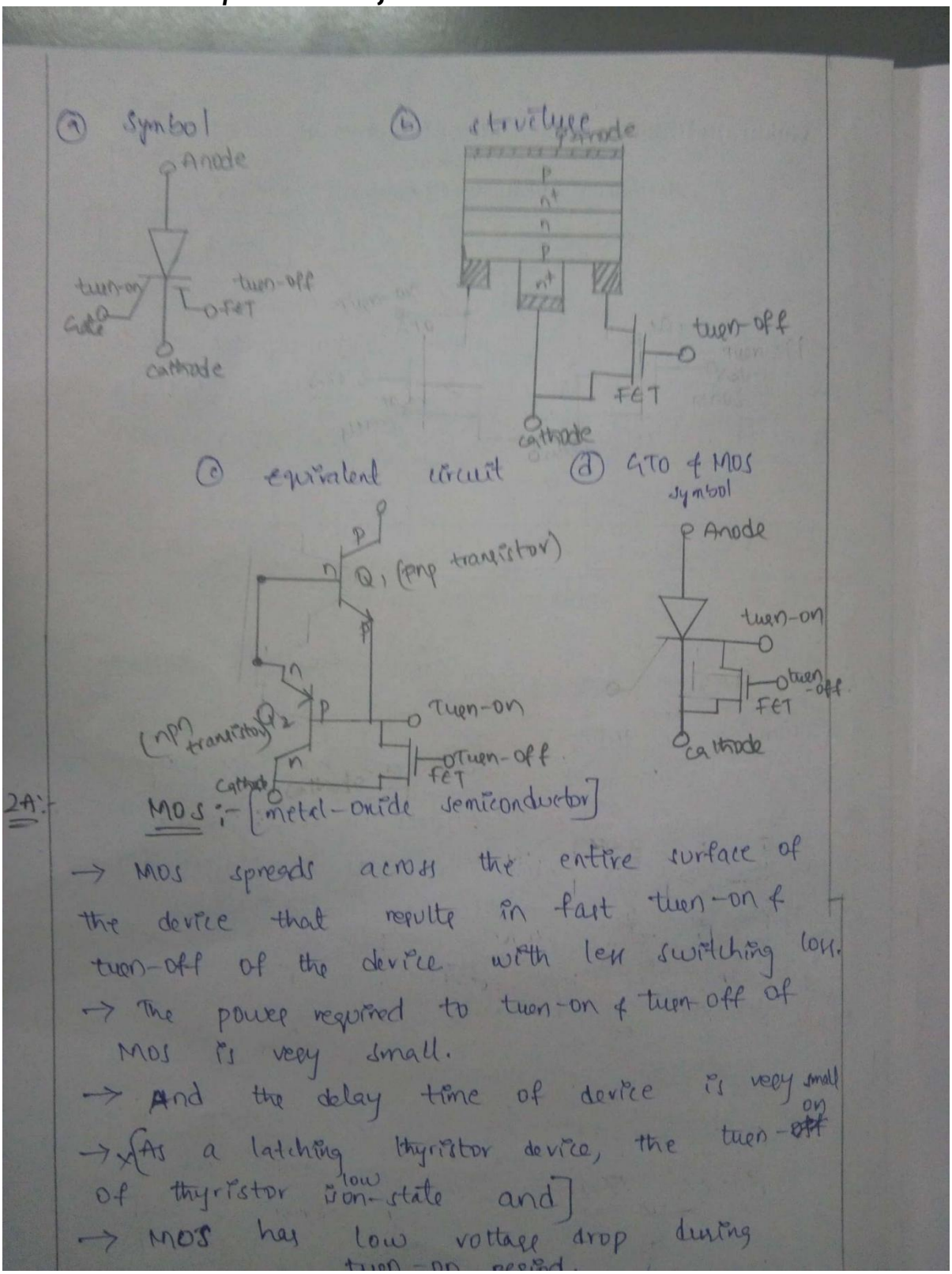
Signature of faculty

Date:

Department of Electrical & Electronics

COURSE OUTCOME AND PROGRAM OUTCOME MAPPING

PO's / CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M				M	H	M	H	M	M	H	H	M	H
CO2	M	M	M	M	M		H		H	M	H	H	M	H
CO3	H	H		H	M		M	M	H	H	H	H	M	H
CO4		M	M				M	H	M		H	H	M	H
CO5			H		M		M	M	M	H	H	H	M	H



2A:

MOS :- [metal-oxide semiconductor]

→ MOS spreads across the entire surface of the device that results in fast turn-on & turn-off of the device with less switching loss.

→ The power required to turn-on & turn off of MOS is very small.

→ And the delay time of device is very small on

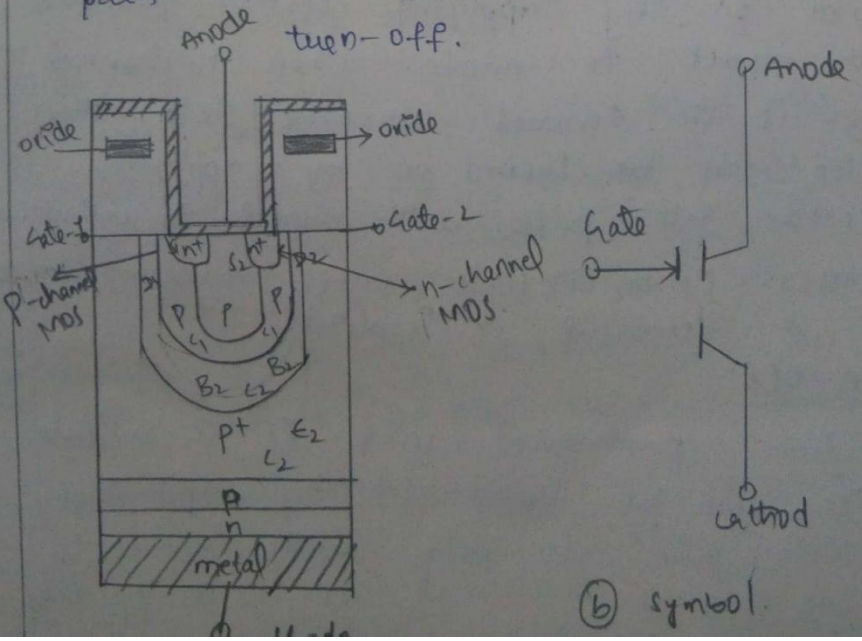
→ ~~x~~ [As a latching thyristor device, the turn-~~off~~ of thyristor is low on-state and]

→ MOS has low voltage drop during

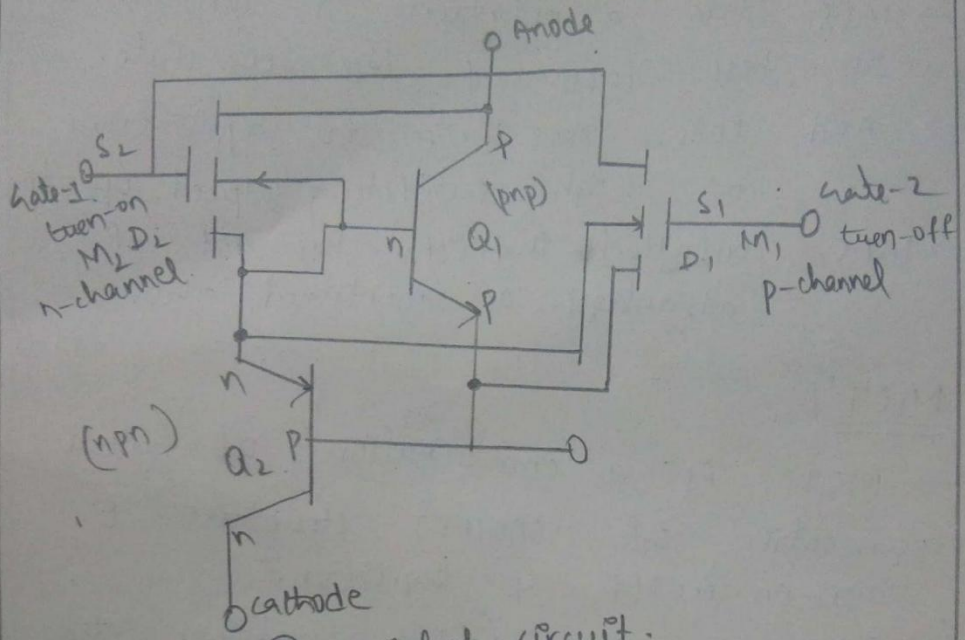
→ MOS has a potention to turn-off with less losses & less on-state.
→ And this gives rise to applications of high switching speed operation.
→ MOS controlled thyristor has lot of advantages as mentioned above.

MCT's :-

→ MCT is a combination of fired regenerative of MOSFET structure & turn-on (or) off of thyristor.
→ Like in IGBT, which combines the advantages of field effect structure and bipolar junction.
→ MCT's are improved with the pair of MOSFET's to turn-on & turn-off.



(b) symbol.



(c) equivalent circuit.

turn-on:-

→ when p-channel MCT is in Forward blocking state, then the device can be turned on by applying negative gate pulse with respect to Anode. when n-channel MCT is in forward blocking state, then device can be turned on by applying positive gate pulse with respect to cathode.

→ MCT is in on-state until reverse current is applied.

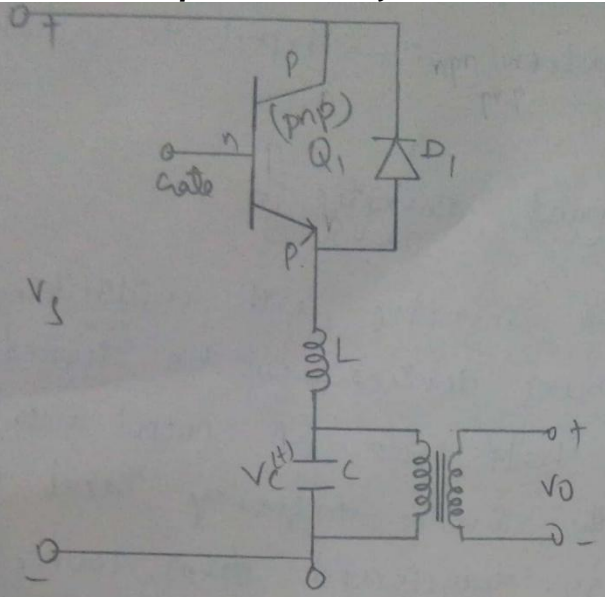
Turn-off:-

→ when p-channel MCT is in on-state, device can be turned-off by applying positive pulse to gate with respect to anode. when n-channel MCT is in on-state

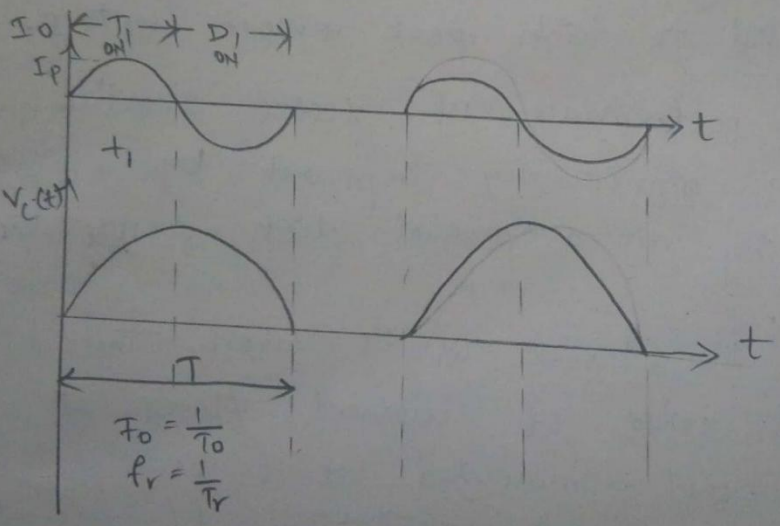
negative gate pulse with respect to cathode.

3.A:- Series Resonant Inverter :-

→ For Resonant inverter with unidirectional switch, the power devices can be turned on in every half-cycle of output voltage.
→ This limits the inverter frequency and amount of energy transferred from source to load.
→ In addition, power devices are subjected to high peak reverse voltage.
→ The performance of series Inverter can be significantly improved by connecting an antiparallel diode across the device.
→ when the device 'Q_1' is fired, the resonant pulse of current flows & Q_2 is self-commutated at $t=t_1$. However, resonant oscillations of current through the diode 'D_1' continous till the current gets back to zero at the end of cycle.
→ The waveforms of load current of power devices are as shown below.



(a) circuit



(b) load current & voltage waveforms.

→ If conducting interval of diode is greater than turn-off period of device. Therefore, output frequency is same as resonant frequency

$f_0 = f_r = \frac{\omega_r}{2\pi}$

where, f_r is resonant frequency in Hertz

→ The minimum device switching time is t_{sw} combines, delay time, fall time, rise time, storage time.

The maximum inverter frequency is given by

$\therefore t_{sw} = t_d + t_f + t_r + t_s$ //

$f_{s(max)} = \frac{1}{2 t_{sw}}$ Hz

→ Note f_0 is less than $f_{s(max)}$.

→ If the switching device is thyristor, t_q is its turn-off time, then maximum inverter frequency is

$f_{s(max)} = \frac{1}{2 t_q}$ Hz.

→ The diode D_1 and transistor 'T_1' are connected as close as possible in order to minimize stray inductance when loop formed between the D_1 & T_1.

Academic Year: **2022-**
Year: **III**
Semester: **II**

MID Exam – I (Descriptive)
Subject Name: Modern Power Electronics
Subject Code: GR20A3093

Date: 20/3/2023
Duration: **90 min**
Max Marks: **15**

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Department of Electrical and Electronics Engineering

Note: Answer any ALL questions. All questions carry equal marks.

Answer ALL questions. All questions carry equal marks

3 * 5 = 15 Marks

Q. No	Questions	Marks	CO	BL	PI
1.	(a) Illustrate on Turn-on and Turn-off characteristics of MTO with advantages	[3]	CO1	BL3	3.1.1
	(b) Analyze the operation $IGCT_S$ with neat diagrams	[2]	CO1	BL3	3.1.4
	OR				
2.	(a) Elaborate on the switchng characteristics of Emitter Turn-off Thyristors (ETO_S)	[2]	CO1	BL4	3.1.4
	(b) Articulate on the working of MCT_S along with the equivalent circuit, symbol and pn-structure	[3]	CO1	BL4	3.1.1
3.	(a) Articulate on the operation of half-bridge series resonant inverters with bi-directional switches with neat diagram and output waveforms	[3]	CO2	BL3	3.1.4
	(b) The basic resonant inverter with bi-directional switches has C=2μF, L=20μH, R=0Ω and V_s=220V. The switching time of transistor is t_{sw}=12μs. The output frequency is f_0=20kHz. Determine (i) the peak supply current I_P and (ii) the rms device current I_R	[2]	CO2	BL4	3.1.6
	OR				
4.	(a) Analyze the operation of basic series resonant inverters with uni-directional switches with neat diagrams and output waveforms	[3]	CO2	BL4	3.1.4
	(b) The basic series resonant inverter with uni-directional switches has L_1=L_2=L=50μH, C=6μF, R=2, V_s=220V and the output frequency is f_0=7kHz. The turn-off time of transistor is t_q=10μs. Determine the available (or circuit) turn-off time t_{off}	[2]	CO2	BL4	3.1.6
5	Describe the working & operation of 3-level diode clamped multi level inverter with neat circuit diagram & waveforms	[5]	CO3	BL4	3.1.4
	OR				
6.	Analyze the working & operation of 3-level flying capacitor multi level inverter with neat circuit diagram & waveforms	[5]	CO3	BL4	3.1.6

Academic Year: **2022-23**
Year: **III**
Semester: **II**

MID Exam – I (Objective)
Subject Name: Modern Power Electronics
Subject Code: GR20A3093

Date: 20/3/2023
Duration: **10 min**
Max Marks: **5M**

Roll No:

Note: Answer ALL questions.
All questions carry equal marks.

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Department of Electrical and Electronics Engineering

Answer all Objective Questions. All questions carry equal marks

Questions	Option	CO	BL	PI
MTO was developed by **A. SPCO** B. Virginia Power Electronics Center C. Bell Laboratories D. GE	[ ]	**CO1**	**BL2**	**2.1.1**
ETO was developed by A. SPCO **B. Virginia Power Electronics Center in Collaboration with SPCO** C. Virginia Power Electronics center D. GE	[ ]	**CO1**	**BL2**	**2.1.1**
IGCT gate firing current is about A. 2 kA/µs **B. 4 kA/µs** C. 6 kA/µs D. 8 kA/µs	[ ]	**CO1**	**BL4**	**3.1.4**
MCT Turn OFF time is **A. 1.25 µs** B. 0.8 µs C. 0.4 µs D. 125 µs	[ ]	**CO1**	**BL4**	**3.1.4**
Impedance of a series RLC circuit at resonance is A. (X_L-X_C) **B. R** C. $(R+j(X_L-X_C))$ D. 0	[ ]	**CO2**	**BL2**	**2.1.1**
In a resonance pulse inverter: **A. DC output voltage variation is wide** B. The frequency is low C.The output voltage is never sinusoidal D. DC saturation of transformer core is minimized	[ ]	**CO2**	**BL3**	**3.1.1**
T_{off}= **A.** $\frac{\Pi}{\omega_0}-\frac{\Pi}{\omega_r}$ B. $2t_{sw}$ C. $\frac{\Pi}{\omega_0}-\frac{\Pi}{\omega_r}$ D. $\frac{\Pi}{\omega_0}*\frac{\Pi}{\omega_r}$ $\frac{\Pi}{\omega_0}/\frac{\Pi}{\omega_r}$	[ ]	**CO2**	**BL4**	**3.1.6**
I_P= A. $Vs*\sqrt{\frac{L}{LC}}$ B. $Vs*\sqrt{\frac{L}{C}}$ **C.** $Vs*\sqrt{\frac{C}{L}}$ D. $Vs*\sqrt{\frac{LC}{C}}$	[ ]	**CO2**	**BL4**	**3.1.6**
If "3" is the level then the no.of power semiconductor switches required/phase in diode clamped MLI is A. 2 B.3 **C.4** D.5	[ ]	**CO3**	**BL4**	**3.1.4**
If "3" is the level then the no.of DC bus voltage capacitors required in flying capacitor MLI is **A. 2** B.3 C.4 D.5	[ ]	**CO3**	**BL4**	**3.1.4**

BL – Bloom's Taxonomy Levels
CO – Course Outcomes
PI – Performance Indicator Code

Academic Year: **2022-**
Year: **III**
Semester: **II**

MID Exam-II (Descriptive)
Subject Name: Modern Power Electronics
Subject Code: GR20A3093

Date: 20/3/2023
Duration: **90 min**
Max Marks: **15**

Note: Answer any ALL questions. All questions carry equal marks.

Answer ALL questions. All questions carry equal marks

3 * 5 = 15 Marks

Q. No	Questions	Marks	CO	BL	PI
1.	Compare different types of MLI in terms of operation and components	**[5]**	**CO3**	**BL3**	**3.1.1**
	OR				

2.	A 1-ϕ diode clamped inverter has m=5. find the peak voltage and current ratings of diodes and switching devices if V_{dc}=5kV and i_0=50 sin(θ-Π/3)	**[5]**	**CO3**	**BL4**	**3.1.4**
3.	(a) Analyze the operation of full bridge dc-dc converter with relevant circuit and waveforms	**[2]**	**CO2**	**BL4**	**3.1.4**
	(b) Articulate on the working operation of fly back dc-dc converter with suitable circuit and waveforms	**[3]**	**CO2**	**BL4**	**3.1.4**
	OR				
4.	(b) Analyze the operation of push-pull dc-dc converter with neat circuit diagram and waveforms	**[3]**	**CO2**	**BL4**	**3.1.4**
	(b) Discuss the working and operation of forward dc-dc converter with the required circuit and waveforms	**[2]**	**CO2**	**BL4**	**3.1.6**
5	Describe the working & operation of Resonant AC power supplies with circuits and waveforms	**[5]**	**CO3**	**BL4**	**3.1.4**
	OR				
6.	Give the clear elaboration on the working & operation of uninterruptible power supplies along with its applications	**[5]**	**CO3**	**BL4**	**3.1.6**

Academic Year: **2022-23**
Year: **III**
Semester: **II**

MID Exam – I (Objective)
Subject Name: Modern Power Electronics
Subject Code: GR20A3093

Date: 20/3/2023
Duration: **10 min**
Max Marks: **5M**

Roll No:

Note: Answer ALL questions. **All questions carry equal marks.**

Answer all Objective Questions. All questions carry equal marks

Questions	Option	CO	BL	PI
If "5" is the level then the no.of capacitors required per each phase is **B.** 12 B.13 **C.10** D.15	[ ]	**CO3**	**BL2**	**2.1.1**
In an "m" level inverter the blocking voltage V_D can be expressed as C. $\frac{(m-1-k)*V_{dc}}{(m-1)}$ B.$\frac{(m-2-k)*V_{dc}}{(m-2)}$ C.$\frac{(m-2-k)*V_{dc}}{(m-1)}$ D.$\frac{(m-1-k)*V_{dc}}{(m-2)}$	[ ]	**CO3**	**BL2**	**2.1.1**
The average output voltage V_0=V_2 in a push-pull converter A. $\frac{N_P*V_1}{N_S}$ **B.** $\frac{N_S*V_1}{N_P}$ C. $\frac{N_P*V_2}{N_S}$ D. None	[ ]	**CO4**	**BL4**	**3.1.4**
Forward converter is similar to A. Half-bridge converter **B. fly-back converter** C. Full-bridge converter D. push-pull converter	[ ]	**CO4**	**BL4**	**3.1.4**
Diodes D_1 and D_2 currents becomes half in push pull converter during B. Only S_1 ON **B. Both switches OFF** C. Only S_2 ON D. Both switches ON	[ ]	**CO4**	**BL2**	**2.1.1**
Half bridge converter is widely used for **B.** low power applications **B. medium power applications** C. high power applications D. DC saturation of transformer core is minimized	[ ]	**CO4**	**BL3**	**3.1.1**
In UPS, the switchover by a mechanical contactor takes place by	[ ]	**CO5**	**BL4**	**3.1.6**

B. 30 to 50ms B. 20 to 30ms C. 30 to 40ms D. 40 to 50ms				
In control circuits of AC power supplies, by varying the duty cycle "k"_____ can be controlled **A. out put voltage** B. out put current C. both A & B D. None	**[ ]**	**CO5**	**BL4**	**3.1.6**
In current mode control circuits of AC power supplies, the current can be used as feedback signal to achieve **A. out put voltage control** B. out put current control C. both A & B D. None	**[ ]**	**CO5**	**BL4**	**3.1.4**
In bidirectional AC power supplies, the cyclo-converter converts_____ A. low-frequency ac to a high-frequency ac **B. high-frequency ac to a low-frequency ac** C. both A & B D. None	**[ ]**	**CO5**	**BL4**	**3.1.4**

BL – Bloom's Taxonomy Levels
CO – Course Outcomes
PI – Performance Indicator Code

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical and Electronics Engineering

III/IV B.Tech II Semester Regular Examinations, May 2023

MODEL PAPER

Modern Power Electronics

(Electrical and Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Instructions:

1. Question paper comprises of **Part-A** and **Part-B**
2. **Part-A** (for 20 marks) must be answered at one place in the answer book.
3. **Part-B** (for 50 marks) consists of **five questions with internal choice,** answer all questions.

PART – A

(Answer ALL questions. All questions carry equal marks)

10 * 2 = 20 Marks

1. a.	Briefly discuss about ETOs	**[2]**	**CO1**	**BL1**
b.	Briefly discuss about IGCT	**[2]**	**CO1**	**BL6**
c.	Mention types of Resonant pulse Inverters	**[2]**	**CO2**	**BL1**
d.	Write the applications of resonant pulse inverters	**[2]**	**CO2**	**BL2**
e.	What are the types of multilevel inverters	**[2]**	**CO3**	**BL1**
f.	Mention the advantages of multilevel inverters	**[2]**	**CO3**	**BL5**
g.	What are the different types of converters we have	**[2]**	**CO4**	**BL1**
h.	Briefly tell about DC Power supplies	**[2]**	**CO4**	**BL1**
i.	Explain shortly about UPS	**[2]**	**CO5**	**BL2**
j.	Briefly tell about AC Power supplies	**[2]**	**CO5**	**BL1**

PART – B

(Answer ALL questions. All questions carry equal marks)

5 * 10 = 50 Marks

2.	**(a)** Explain the turn-on and turn-off operation of MTO with its equivalent circuit. **(b)** What are the advantages and disadvantages of ETOs?	**[10]**	**CO1**	**BL2** **BL1**
	OR			
3.	**(a** What are the advantages and disadvantages of MCTs? **(b)** Explain the operation of IGCT with its equivalent circuit.	**[10]**	**CO1**	**BL1** **BL5**
4.	**(a)** Analyze Full bridge series resonant inverter with Bi-directional switches? **(b)** The half bridge resonant inverter is operated at an output frequency of 7kHz. If C1=C2=3µf, R=2ohm, L1=L2=L=50µH, determine i) Peak supply current ii) Average thyristor current RMS thyristor current	**[10]**	**CO2**	**BL4** **BL3**
	OR			
5.	**(a)** Explain the frequency response of Series Resonant Inverters for Series loaded and parallel loaded. **(b)** Evaluate voltage and currents simple resonant inverter analysis of half bridge	**[10]**	**CO2**	**BL2** **BL5**

6.	**(a)** Discuss operation of flying capacitor multi level inverter (b) Explain the features of flying capacitor multi level inverter	**[10]**	**CO3**	**BL6** **BL2**
	OR			
7.	**(a)** Explain the operation of a five-level, single phase diode clamped inverter with neat circuit diagram and waveforms. b) What are the advantages and disadvantages of Diode-Clamped Inverter?	**[10]**	**CO3**	**BL5** **BL1**
8.	**(a)** Explain the operation of Forward converter employed in Switched mode Power supplies . b) Give the classification of Switched Mode Power Supplies.	**[10]**	**CO4**	**BL5** **BL5**
	OR			
9.	(a) Explain the operation of Push pull convereter (b) Mention the applications of Resonant DC power supplies	**[10]**	**CO4**	**BL5** **BL5**
10.	(a) Explain about Bidiretional AC Power supplies. (b) Explain in detail about Resonant AC power supplies	**[10]**	**CO5**	**BL2** **BL2**
	OR			
11.	**(a)** Classify AC Power Supplies and give their applications. **(b)** Discuss the working of both ON-Line and OFF-Line UPS with neat circuit diagrams.	**[10]**	**CO5**	**BL2** **BL6**

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical and Electronics Engineering

Gokaraju Rangaraju Institute of Engineering and Technology, (Autonomous)

III B.Tech-(MPE-GR20A3093) Sem-II, Mid-I Marks (2022-23) of SECTION A

Department of Electrical and Electronics Engineering

S. NO	ROLL NO	1 (CO1)	2 (CO1)	3 (CO2)	4 (CO2)	5 (CO3)	6 (CO3)	Descriptive Marks	QUIZ Marks	Total Marks
1	20241A0201	4		4		3		**11**	3	**14**
2	20241A0202	3		4		5		**12**	4	**16**
3	20241A0204	5		5		5		**15**	5	**20**
4	20241A0207		0	1				**1**	4	**5**
5	20241A0208	4		4.5		4.5		**13**	4	**17**
6	20241A0212	5		4		5		**14**	4	**18**
7	20241A0213									
8	20241A0214		0	1				**1**	4	**5**
9	20241A0215	3		5		5		**13**	3	**16**
10	20241A0216	5		5		5		**15**	4	**19**
11	20241A0218	5		5		5		**15**	4	**19**
12	20241A0219	3		0		0		**3**	3	**6**
13	20241A0220	2		1				**3**	4	**7**
14	20241A0221	3		4		1		**8**	3	**11**
15	20241A0222	3		2			2	**7**	3	**10**
16	20241A0223	5		5		5		**15**	4	**19**
17	20241A0224	1		1				**2**	4	**6**
18	20241A0233	5		5		5		**15**	4	**19**
19	20241A0235	5		5		5		**15**	4	**19**
20	20241A0236	4		3				**7**	4	**11**
21	20241A0237		0	3		2		**5**	4	**9**
22	20241A0238	1		4		1		**6**	4	**10**
23	20241A0239	5		5		5		**15**	4	**19**
24	20241A0240	1		5		4		**10**	4	**14**
25	20241A0242	5		4		5		**14**	4	**18**
26	20241A0243	5		5		5		**15**	4	**19**
27	20241A0244	0		4		1		**5**	4	**9**
28	20241A0245		2	4		5		**11**	5	**16**
29	20241A0246	5		4		5		**14**	4	**18**
30	20241A0248	5		5		5		**15**	5	**20**
31	20241A0252	3		4		5		**12**	4	**16**
32	20241A0253		0	4		4		**8**	3	**11**

33	20241A0256	1		4				**5**	5	**10**
34	20241A0257	5		5		5		**15**	5	**20**
35	21245A0201	5		5		5		**15**	5	**20**
36	21245A0202		4	4		2		**10**	5	**15**
37	21245A0203	5		1				**6**	5	**11**
38	21245A0206	5		5		4		**14**	5	**19**
39	21245A0207	3		3				**6**	4	**10**
40	21245A0208		1			4		**5**	5	**10**
41	21245A0209			5		1		**6**	5	**11**
	Total	119	7	147.5	0	121.5	2			
	No of students attempted(NSA)	32	7	39	0	31	1			
	Attempt %=(NSA/ Total no of students)*100	48.48484848	10.60606061	59.09090909	0	46.96969697	1.515151515			
	Average (attainment)= Total/NSA	3.71875	1	3.782051282	#DIV/0!	3.919354839	2			
	Attainment % = (Total/no.of max marks*no.of students attempted)*100	74.375	20	75.64102564	#DIV/0!	78.38709677	40			
		1 (CO1)	**1 (CO1)**	**2 (CO2)**	**2 (CO2)**	**3 (CO3)**	**3 (CO3)**			

A

CO1	47.19	
CO2	75.64	
CO3	59.19	

Final Average values of A		CO1	47.19
		CO2	75.64
		CO3	59.19

GOKARAJU RANGARAJU
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Department of Electrical and Electronics Engineering

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III B.Tech-(MPE-GR20A3093) Sem-II, Mid-II Marks (2022-23) of SECTION A

Department of Electrical and Electronics Engineering

S. NO	ROLL NO	1 (CO3)	2 (CO3)	3 (CO4)	4 (CO4)	5 (CO5)	6 (CO5)	Descriptive Marks	QUIZ Marks	Total Marks
1	20241A0201		1	5		1		**7**	3	**10**
2	20241A0202		5	5			2	**12**	3	**15**
3	20241A0204		5	5			5	**15**	5	**20**
4	20241A0207		5			3		**8**	3	**11**
5	20241A0208		5	5		2		**12**	3	**15**
6	20241A0212		5	5		3		**13**	4	**17**
7	20241A0214							**0**		**0**
8	20241A0215		2	5			5	**12**	4	**16**
9	20241A0216		2	5			3	**10**	4	**14**
10	20241A0218		5	5			5	**15**	4	**19**
11	20241A0219		5	2				**7**	4	**11**
12	20241A0220		5	5			5	**15**	4	**19**
13	20241A0221		5	2				**7**	3	**10**
14	20241A0222		5	5		3		**13**	3	**16**
15	20241A0223		5	5			4	**14**	3	**17**
16	20241A0224		5				3	**8**	3	**11**
17	20241A0233		5	5			3	**13**	4	**17**
18	20241A0235		5	4			4	**13**	4	**17**
19	20241A0236		5	0				**5**	3	**8**
20	20241A0237		5	2				**7**	4	**11**
21	20241A0238		5	5			4	**14**	3	**17**
22	20241A0239		5	5			3	**13**	4	**17**
23	20241A0240		5	5			3	**13**	4	**17**
24	20241A0242		5	5			5	**15**	4	**19**
25	20241A0243		5	5			5	**15**	4	**19**
26	20241A0244		5	5			4	**14**	3	**17**
27	20241A0245		5	5			5	**15**	5	**20**
28	20241A0246		5	5			4	**14**	4	**18**
29	20241A0248		5	5			5	**15**	5	**20**
30	20241A0252		5	1		3		**9**	4	**13**
31	20241A0253		5	4			1	**10**	4	**14**
32	20241A0256		5	4				**9**	3	**12**
33	20241A0257		5	5			4	**14**	5	**19**

34	21245A0201		5	5			5	**15**	5	**20**
35	21245A0202		5	5			4	**14**	3	**17**
36	21245A0203		5	4			5	**14**	3	**17**
37	21245A0206		5	5			5	**15**	5	**20**
38	21245A0207		5	5			5	**15**	3	**18**
39	21245A0208		5	4				**9**	3	**12**
40	21245A0209		5	5			3	**13**	4	**17**
	Total	0	185	162	0	15	109			
	No of students attempted(NSA)	0	39	37	0	6	27			
	Attempt %=(NSA/Total no of students)*100	0	59.09090909	56.06060606	0	9.090909091	40.90909091			
	Average (attainment)= Total/NSA	#DIV/0!	4.743589744	4.378378378	#DIV/0!	2.5	4.037037037			
	Attainment % = (Total/no.of max marks*no.of students attempted)*100	#DIV/0!	94.87179487	87.56756757	#DIV/0!	50	80.74074074			
		1 (CO1)	**1 (CO1)**	**2 (CO2)**	**2 (CO2)**	**3 (CO3)**	**3 (CO3)**			

A

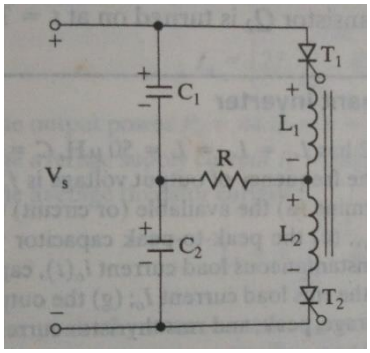
CO1	47.19	
CO2	75.64	
CO3	59.19	

Final Average values of A		CO1	47.19
		CO2	75.64
		CO3	77.03
		CO4	87.568
		CO5	65.3705

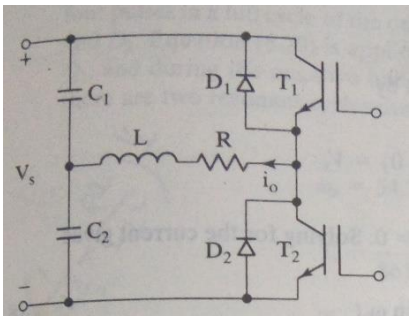
Modern Power Electronics

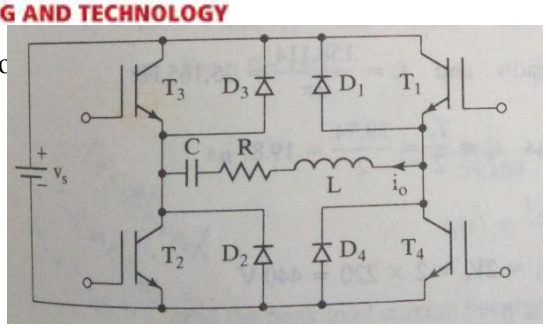
Slip Test– I

1. Explain the turn-on and turn-off operation of MTO with its equivalent circuit.
2. Explain the turn-on and turn-off operation of ETO with its equivalent circuit.
3. What is MOS controlled thyristor? Draw and explain its schematic and equivalent Circuit for p-channel MCT'S.
4. Explain the operation of Half-bridge series resonant inverter with necessary circuit diagram and waveforms.
5. Explain the operation of series resonant inverter with bidirectional switches along with necessary output waveforms.
6. The half-bridge resonant inverter shown in figure uses nonovelapping control. The inverter frequency is $f_o = 8.5$kHz. If C1 = C2= C= 2uF, L1=L2=L=40 uH, R=2Ω, and Vs = 220V. Determine (a) the peak supply current (b) the average thyristor current I_A and (c) the rms thyristor current I_R.



7. The Half-bridge resonant inverter shown in figure is operated at frequency fo = 3.5 kHz in the nonoverlap mode. If C1 = C2 = C = 2uF, L = 20uH, R = 1.5Ω and Vs = 220 V, determine (a) the peak supply current, (b) the average thyristor current IA, (c) the rms thyristor current I_R (d) the rms load current and (e) the average supply current.





8. The fullbridge resonant inverter ahown in figure is operated at a frequency of fo = 3.5 kHz, C = 2uF, L = 20uH, R = 1.5Ω, and Vs = 220V. Determine (a) the peak supply current, (b) the average thyristor current IA, (c) the rms thyristor current I_R (d) the rms load current and (e) the average supply current.

Slip Test– II

1. Give the classification of Multi-Level inverters (MLI).
2. Explain the operating principle of operation of a Flying capacitors MLI with its output waveforms.
3. Explain the working of Push-pull converter under Continuous mode of operation with its circuit diagram and draw its output waveforms.
4. Give the comparison of the different Multi level inverters.
5. What are the advantages and disadvantages of a Half-Bridge converter?
6. Explain the various modes of operation of Full-Bridge converter using a neat circuit diagram
7. Explain the working of Forward converter under discontinuous mode of operation for DC to AC conversion employed in SMPS.
8. With a neat circuit diagram explain the working of a Resonant AC power supplies.
9. What are the various applications of AC power supplies?
10. Write short notes on the following: i) UPS ii) Power line disturbances iii) Power Conditioners

MPE IMPORTANT QUESTIONS

UNIT-I

1. a) Explain the turn-on and turn-off operation of MTO with its equivalent circuit.
   b) What are the advantages and disadvantages of ETOs?
2. a) What are the advantages and disadvantages of MCTs?
   b) Explain the operation of IGCT with its equivalent circuit.

3. What is MOS controlled thyristor? Draw and explain its schematic and equivalent circuit for p-channel MCT'S.

UNIT-II

1. a) Analyze Full bridge series resonant inverter with Bi-directional switches?
   b) The half bridge resonant inverter is operated at an output frequency of 7 kHz.
   If C1=C2=3uf, R=2ohm, L1=L2=L=50uH, determine
   i) Peak supply current
   ii) Average thyristor current
   iii) RMS thyristor current

2. a) What is the principle of ZeroVoltage Switching(ZVS) Resonant Converters?
   b) What are the advantages and limitations of ZCS Resonant Converters?

3. a) Explain the frequency response of Series Resonant Inverters for Series loaded and parallel loaded.
   b) The class E resonant inverter operates at resonance and has Vs=18v and R=10ohm.The switching frequency is f_s=50KHz.Determine the optimum values of L, C, Ce, and Le.

4. a) What is the principle of Zero Current Switching(ZCS) Resonant Converters?
   b) What are the advantages and limitations of ZCS Resonant Converters?

5. a) Using neat circuit diagrams and waveforms, explain the operation of class E resonant inverter.
   b) The full bridge resonant inverter is operated at a frequency f_0 = 3.5 KHz. If C = 6μF, L = 50μH, R = 2Ω and V_s = 220V. Determine
   i) Peak supply current
   ii) Average device current I_A
   iii) RMS load current.

UNIT-III

1. a) Explain the operation of a five-level, single phase diode clamped inverter with neat circuit diagram and waveforms.
   b) What are the advantages and disadvantages of Diode-Clamped Inverter?

2. a) What is a cascaded multilevel inverter? What are the advantages and disadvantages of it?
   b) What are the applications of multi-level inverters?

3. a) Explain Multilevel Inverter concept and classify them.
   b) Explain the principle of operation of Cascaded Multilevel Inverter with neat circuit diagram.

4. a) Explain principle of flying capacitor Multilevel Inverter.
   b) What are the applications of multi-level inverters?

5. Explain the dc link capacitor voltage balances in multilevel inverter. What are the advantages of flying capacitor multilevel inverters?

UNIT-IV

1. a) Explain the operation of Forward converter employed in Switched mode Power supplies
   b) Give the classification of Switched Mode Power Supplies.

2. Explain the working of fly back converter under discontinuous mode of operation for dc to ac conversion employed in switched mode dc power supplies
3. a) Explain the operation of full bridge converter using neat circuit diagram and necessary waveforms.
   b) What are the advantages and disadvantages of Forward converter?
4. The average output voltage of the Push-Pull circuit is Vo =24V at a resistance load of R=0.8ohms. The ON-state voltage drops of transistors and diodes are V_t =1.2V, and V_d =0.7V respectively. The turns ratio of the transformer is 'a'= Ns/Np=0.25. Find i) The average input current (Is) ii) The efficieny (η) iii) The average Transistor current (I_A) iv) The Peak transistor current (I_P) v) The rms Transistor current (I_R) vi) The open circuit voltage (Voc). Neglect losses in a transformer and the ripple current of the load and input supply are negligible. Assume Duty cycle K=0.5.

5. The average output voltage of the Fly back circuit is Vo =24V at a resistance load of R=1ohm. The ON-state voltage drops of transistors and diodes are V_t=1.2V, and V_d =0.7V respectively. The turns ratio of the transformer is 'a'= Ns/Np=0.25. Find
   i) The average input current (Is) ii) The efficieny (η) iii) The average Transistor current (I_A)
   iv) The Peak transistor current (I_P) v) The rms Transistor current (I_R)
   vi)The open circuit voltage (Voc). Neglect losses in a transformer and the ripple current of the load and input supply are negligible. Assume Duty cycle K=0.5.

UNIT-V

1. a) Classify AC Power Supplies and give their applications.
   b) Discuss the working of both ON-Line and OFF-Line UPS with neat circuit diagrams.

2. a) Explain about Un Interrupt able Power supplies.
   b) Explain in detail about Resonant AC power supplies
3. Write short notes on the following.
   a) Integrated Gate-Commutated thyristor (Unit I)
   b) Power conditioners. (Unit V)
   c) Effects of series loading in a series-resonant inverter. (Unit III)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electrical and Electronics Engineering

EVALUATION STRATEGY

Academic **Y**ear : 2022-23

Semester : II

Name of the Program : B.Tech Year: III Section: A

Course/Subject : Modern Power Electronics

Name of the Faculty : Dr Pakkiraiah B Dept: EEE

Designation : Associate Professor

1. TARGET:

A) Percentage for pass: 100%

2. COURSE PLAN & CONTENT DELIVERY

Units/Lessons will be covered by lectures, presentations, exercises, solving numerical problems, demonstration of models and by assignments.

3. METHOD OF EVALUATION

3.1 Continuous Assessment Examinations (CAE-I, CAE-II)
3.2 Assignments

Signature of HOD

Date:

Signature of faculty

Date: