COURSE OBJECTIVES

Academic Year : 2013-2014
Semester : I

Name of the Program: B.Tech ELECTRICAL           Year: III   Section: B
Course/Subject: POWER ELECTRONICS             Course Code: GR11A3080
Name of the Faculty: G SWAPNA                  Dept: EEE.
Designation : ASST.PROFESSOR

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

<table>
<thead>
<tr>
<th>S.No</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>To provide the students a deep insight in to the working of different switching devices with</td>
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<tr>
<td></td>
<td>respect to their characteristics</td>
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<tr>
<td>2</td>
<td>To analyze different converters and control with their applications.</td>
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<tr>
<td>3</td>
<td>To study advanced converters and switching techniques implemented in recent technology</td>
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</tbody>
</table>

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 objectives.
COURSE OUTCOMES

Academic Year : 2013-2014
Semester : I
Name of the Program: B.Tech ELECTRICAL Year: III Section: B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

The expected outcomes of the Course/Subject are:

| 1. Articulate the basics of power electronic devices |
| 2. Express the design and control of rectifiers, inverters. |
| 3. Design of power electronic converters in power control applications |
| 4. Ability to express characteristics of SCR, BJT, MOSFET and IGBT. |
| 5. Ability to express communication methods. |
| 6. Ability design AC voltage controller and Cyclo Converter. |
| 7. Ability to design Chopper circuits. |

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.
Gokaraju Rangaraju Institute of Engineering and Technology

(An Autonomous Institute under JNTUH)

Department/Program-EEE

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.

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.

**Name of the Course: Power Electronics**

**Course educational objectives:**

1. To provide the students a deep insight into the working of different switching devices with respect to their characteristics.
2. To analyze different converters and control with their applications.
3. To study advanced converters and switching techniques implemented in recent technology.

**Course outcomes:**

At the end of the course student will have ability to

1. Articulate the basics of power electronic devices
2. Express the design and control of rectifiers, inverters.
3. Design of power electronic converters in power control applications
4. Ability to express characteristics of SCR, BJT, MOSFET and IGBT.
5. Ability to express communication methods.
6. Ability design AC voltage controller and Cyclo Converter.
7. Ability to design Chopper circuit, Inverter circuit.

Assessment methods:

1. Written tests clearly linked to learning objectives
2. Classroom assessment techniques like tutorial sheets and assignments.
3. Regular attendance to classes.

1. **Program Educational Objectives (PEOs) – Vision/Mission Matrix** (Indicate the relationships by mark “X”)

<table>
<thead>
<tr>
<th>PEOs</th>
<th>Mission of department</th>
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<tbody>
<tr>
<td></td>
<td>Higher Learning</td>
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<tr>
<td>Graduates will have a successful technical or professional careers, including supportive and leadership roles on multidisciplinary teams</td>
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<tr>
<td>Graduates will be able to acquire, use and develop skills as required for effective professional practices</td>
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<tr>
<td>Graduates will be able to attain holistic education that is an essential prerequisite for being a responsible member of society</td>
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<tr>
<td>Graduates will be engaged in life-long learning, to remain abreast in their profession and be leaders in our technologically vibrant society.</td>
<td>X</td>
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</tbody>
</table>

2. **Program Educational Objectives(PEOs)-Program Outcomes(POs) Relationship Matrix** (Indicate the relationships by mark “X”)

<table>
<thead>
<tr>
<th>P-Outcomes</th>
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</table>

3. **Course Objectives-Course Outcomes Relationship Matrix** (Indicate the relationships by mark “X”)

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<thead>
<tr>
<th>Course-Outcomes</th>
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</table>
4. **Course Objectives-Program Outcomes (POs) Relationship Matrix** (Indicate the relationships by mark “X”)

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<tr>
<th>P-Outcomes</th>
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</table>

5. **Course Outcomes-Program Outcomes (POs) Relationship Matrix** (Indicate the relationships by mark “X”)

<table>
<thead>
<tr>
<th>P-Outcomes</th>
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</table>

6. **Courses (with title & code)-Program Outcomes (POs) Relationship Matrix** (Indicate the relationships by mark “X”)

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

<table>
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8. Assignments & Assessments-Program Outcomes (POs) Relationship Matrix (Indicate the relationships by mark “X”)

<table>
<thead>
<tr>
<th>P-Objectives</th>
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9. Assignments & Assessments-Program Educational Objectives (PEOs) Relationship Matrix (Indicate the relationships by mark “X”)

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<thead>
<tr>
<th>P-Objectives</th>
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10. Constituencies -Program Outcomes (POs) Relationship Matrix (Indicate the relationships by mark “X”).

1. Alumni
2. Government employers
3. Students

<table>
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<tr>
<th>P-Objectives</th>
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GUIDELINES TO STUDY THE COURSE / SUBJECT

Academic Year : 2013-2014
Semester : I

Name of the Program: B.Tech ELECTRICAL Year: III Section: B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

Guidelines to study the Course/ Subject: …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.
- Every student will be given 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:
# COURSE SCHEDULE

**Academic Year**: 2013-2014  
**Semester**: I  
**Name of the Program**: B.Tech ELECTRICAL  
**Year**: III  
**Section**: B  
**Course/Subject**: POWER ELECTRONICS  
**Course Code**: GR11A3080

**Name of the Faculty**: G SWAPNA  
**Designation**: ASST.PROFESSOR  
**Dept**: EEE.

### The Schedule for the whole Course / Subject is:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Duration (Date) From</th>
<th>Duration (Date) To</th>
<th>Total No. Of Periods</th>
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<tbody>
<tr>
<td>1.</td>
<td>Power Semiconductor Devices Devices And Commutation Circuits</td>
<td>4-7-2013</td>
<td>27-7-2013</td>
<td>16</td>
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</tbody>
</table>
| 2.     | Single Phase Half Controlled Converters  
Single Phase Fully Controlled Converters  
Three Phase Line Commutated Converters | 1-8-2013             | 12-9-2013          | 24                  |
| 3.     | Ac Voltage Controllers And Cyclo Converters                                | 14-9-2013            | 28-9-2013          | 10                  |
| 4.     | Choppers                                                                    | 3-10-2013            | 12-10-2013         | 8                   |
| 5.     | Inverters                                                                   | 24-10-2013           | 2-11-2013          | 8                   |

Total No. of Instructional periods available for the course: 66 Periods  

Signature of HOD  
Date:  
Signature of faculty  
Date:
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

#### ILLUSTRATIVE VERBS FOR STATING SPECIFIC OBJECTIVES/OUTCOMES:

#### A. COGNITIVE DOMAIN (KNOWLEDGE)

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension Understanding</th>
<th>Application of knowledge &amp; comprehension</th>
<th>Analysis Of whole w. r.t. its constituents</th>
<th>Synthesis</th>
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#### B. AFFECTIVE DOMAIN (ATTITUDE)

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#### C. PSYCHOMOTOR DOMAIN (SKILLS)

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# SCHEDULE OF INSTRUCTIONS

## COURSE PLAN

**Academic Year**: 2013-2014  
**Semester**: I  
**Name of the Program**: B.Tech ELECTRICAL  
**Year**: III  
**Section**: B  
**Course/Subject**: POWER ELECTRONICS  
**Course Code**: GR11A3080  
**Name of the Faculty**: G SWAPNA  
**Dept**: EEE.  
**Designation**: ASST.PROFESSOR  
**Text Books**: T1. PS Bimbhra, T2: MD singh & Kanchandhani

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Signature of HOD

Signature of faculty

Date:

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Syllabus

UNIT – I

POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS: Thyristors – Silicon Controlled Rectifiers (SCR’s) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on and Turn off methods– Dynamic characteristics of SCR - Turn on and Turn off times -Salient points.


UNIT – II

SINGLE PHASE HALF WAVE CONTROLLED CONVERTERS: Phase control technique – Single phase Line commutated converters – Half wave controlled converters with Resistive, RL load and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Free wheeling Diode – Numerical problems

SINGLE PHASE FULLY CONTROLLED CONVERTERS: Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters , semi-inverters, active and Reactive power inputs to the converters , Effect of source inductance – Expressions of load voltage and current – Numerical problems.

THREE PHASE LINE COMMUTATED CONVERTERS: Three phase converters

UNIT – III


UNIT – IV


Morgan’s chopper – Jones chopper - Oscillation choppers (Principle of operation only) -waveforms — AC Chopper – Problems.

UNIT – V


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#### UNIT PLAN

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**Semester**: I  
**UNIT NO.:** …1.

**Name of the Program**: B.Tech  
**Year**: III  
**Name of the Faculty**: G SWAPNA  
**Course/Subject**: POWER ELECTRONICS  
**Course Code**: GR11A3080  
**Designation**: ASST.PROFESSOR  
**Dept**: EEE.

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**Date:**

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**UNIT PLAN**

**Academic Year**: 2013-2014  
**Semester**: I  
**UNIT NO.: **2.

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

**Course/Subject**: ......POWER ELECTRONICS...  
**Course Code**: GR11A3080

**Name of the Faculty**: ...G.SWAPNA  
**Dept.**: EEE  
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<td>10-8-2013</td>
<td>2</td>
<td>Performance parameters</td>
<td>2,3 &amp; 2,3</td>
<td>T1:P309</td>
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<td>13.</td>
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<td>17-8-2013</td>
<td>2</td>
<td>Fully controlled converter with R-load midpoint type, Bridge type</td>
<td>2,3 &amp; 2,3</td>
<td>T1:P263-P266</td>
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<td>15.</td>
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<td>16.</td>
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<td>2,3 &amp; 2,3</td>
<td>T1:P279-281,P314-316</td>
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<td>2 &amp; 3</td>
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<td>2 &amp; 2,3</td>
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<td>T1:P324-P330</td>
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Signature of HOD  
Signature of faculty

**Date:**  
**Note:**  
1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.  
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED IN BOLD  
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUTCOME NUMBERS AGAINST EACH TOPIC.
### SCHEDULE OF INSTRUCTIONS

**UNIT PLAN**

**Academic Year:** 2013-2014  
**Semester:** I / II  
**UNIT NO:** 3

**Name of the Program:** B.Tech  
**Year:** ………………  
**Section:** B

**Course/Subject:** …………POWER ELECTRONIC III…  
**Course Code:** GR11A3080

**Name of the Faculty:** …G.SWAPNA  
**Dept.:**….EEE

**Designation:** ASST.PROFESSOR

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**Signature of HOD**  
**Signature of faculty**

**Date:**

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SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year : 2013-2014
Semester : I
UNIT NO : 4

Name of the Program: B.Tech .......... Year: ......III..... Section: B
Course/Subject: ............POWER ELECTRONICS...... Course Code: GR11A3080
Name of the Faculty: ...G.SWAPNA Dept.: ...EEE
Designation: ASST.PROFESSOR

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<th>Lesson No.</th>
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<td>2,3 &amp; 2,7</td>
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</table>

Signature of HOD  
Signature of faculty

Date:  
Date:

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2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED IN BOLD
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.
# SCHEDULE OF INSTRUCTIONS
## UNIT PLAN

### Academic Year: 2013-2014

**Semester:** I  
**UNIT NO.: 5**

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

**Course/Subject:** POWER ELECTRONICS  
**Course Code:** GR11A3080

**Name of the Faculty:** G.SWAPNA  
**Dept.:** EEE

**Designation:** ASST.PROFESSOR

<table>
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<th>Unit No.</th>
<th>Lesson No.</th>
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<th>No. of Periods</th>
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**Signature of HOD**  
**Signature of faculty**

**Date:**

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LESSON PLAN

Academic Year : 2013-2014         Date: 4-7-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL       Year: III   Section B
Course/Subject: POWER ELECTRONICS             Course Code: GR11A3080
Name of the Faculty: G SWAPNA                  Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 1                                    Duration of Lesson: 2hr
Lesson Title: Introduction to power Electronics

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Understand the basics of power electronics
2. Types of power Electronics Devices
3. Different types of converters

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Introduction to Power Electronics, Power electronics switches, converters, applications.

(obj 1, out 1)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014  Date:  6-7-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL  
Course/Subject: POWER ELECTRONICS

Year: III  Section B

Course Code: GR11A3080

Name of the Faculty: G SWAPNA  
Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 2  
Duration of Lesson: 2hr

Lesson Title: Thyristors, BJT, Mosfet

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Difference between a thyristor and a diode
2. BJT structure, characteristics
3. Mosfet structure, characteristics

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Thyristor symbol, structure, Thyristors terminals, construction, BJT structure, characteristics, Mosfet characteristics

Assignment / Questions:

Q1.  Describe the various modes of operation of Power MOSFET with the help of its Circuit diagram and static V-I characteristics and transfer characteristics. Explain how Power MOSFET can be turned-on and turned-off.

(Obj 1, out 4)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014       Date: 11-7-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS       Course Code: GR11A3080

Name of the Faculty: G SWAPNA       Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 3       Duration of Lesson: 2hr

Lesson Title: Basic theory of operation of Thyristors, Static V-I characteristics, Dynamic Characteristics

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Modes of operation of SCR
2. Different modes of a Thyristors

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Operation of SCR, modes of operation of SCR, firing angle gate pulse, Operation of SCR, modes of operation of SCR, Turn-on and Turn–Off times of an SCR, Reverse recovery time of an SCR, circuit turn off time, latching current, holding current, review of the class

Assignment / Questions:

Q1. (a). Describe the different modes of operation of a Thyristor with the help of schematic diagram, static V-I characteristics. (b). Explain why holding current is less than latching current. (obj 1 and out 1)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014   Date: 13-7-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL   Year: III   Section B
Course/Subject: POWER ELECTRONICS   Course Code: GR11A3080
Name of the Faculty: G SWAPNA   Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 4   Duration of Lesson: 2hr
Lesson Title: Thyristor Protection, Turn-ON Methods

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. understand the Protection of Thyristor
2. Snubber circuit details
3. Turn on methods of a Thyristors
4. Latching current , Holding current

Course Objectives:
1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Why protection is needed for Thyristors, what are the causes of damage of a Thyristor, how the SCRs can be protected from extreme conditions, complete circuit diagram consisting of components protecting the Thyristors, different turn on methods of a Thyristors, Latching current, Holding Current, importance of gate triggering

Assignment / Questions:
Q1. Define the i) ) Forward break over voltage ii) Latching current iii) Finger voltage iv) SCR turn-off time (obj1 and out5)

Q2. Different turn-on methods of a Thyristor (obj 1, out 5)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014          Date: 18-7-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL        Year: III  Section B
Course/Subject: POWER ELECTRONICS          Course Code: GR11A3080
Name of the Faculty: G SWAPNA          Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 5                                       Duration of Lesson: 2hr
Lesson Title: Two Transistor Analogy, firing circuit model

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The two transistor model of a Thyristor
2. Operation of a Thyristor in two transistor model of a Thyristor
3. Triggering circuit model of a thyristor

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Two transistor model of a Thyristor, operation, Triggering circuit model of a Thyristor, control circuit, power circuit model

Assignment / Questions:

Q1. Explain two transistor model of a Thyristor and derive the expression for anode current

(obj 1, out 1)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014  Date: 20-7-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS  Course Code: GR11A3080

Name of the Faculty: G SWAPNA  Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 6  Duration of Lesson: 2hr

Lesson Title: UJT triggering circuit, Series operation

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Basic triggering method of SCRs
2. Firing angle control
3. The importance of connecting the SCRs in series
4. Operation of SCRs when connected in series

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

The firing circuits of SCR, UJT firing circuit, firing angle control, description of pulse transformer, Why the SCRs are connected in series? the variation of characteristics of series connected SCRs, Preventive measures to be taken when the SCRs are connected in series

Assignment / Questions:

Q1. Explain the operation of series connected SCRs with the help of neat circuit diagram. (Obj 1, out 3)
LESSON PLAN

Academic Year : 2013-2014              Date: 25-7-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL                            Year: III   Section B
Course/Subject: POWER ELECTRONICS                                      Course Code: GR11A3080

Name of the Faculty: G SWAPNA                                                  Dept: EEE.
Designation : ASST.PROFESSOR
Lesson No: 7                                                       Duration of Lesson: 2hr
Lesson Title: static Equalizing circuit , Dynamic Equalizing circuit

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:
1. The importance of connecting the SCRs in series
2. Operation of SCRs when connected in series
3. Salient points about Dynamic equalizing circuit

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics
2. To analyze different converters and control with their applications.

TEACHING AIDS           : BOARD, MARKER, DUSTER, SLIDES
TEACHING POINTS     :

Operation of SCRs when connected in series, the need of connecting dynamic equalizing circuit when the SCRs are connected in series, derivation of Dynamic equalizing circuit

Assignment / Questions:
Q1. Explain the operation of series connected SCRs with the help of neat circuit diagram. (Obj 1,2 & out 1,2,3)
Q2. Derive the expression for static equalizing circuit. (Obj 1, out 1,2,3)
Q3. Derive the expression for dynamic equalizing circuit         (Obj 1, out 1,2,3)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014  Date: 27-7-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL  Year: III  Section B
Course/Subject: POWER ELECTRONICS  Course Code: GR11A3080
Name of the Faculty: G SWAPNA  Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 8  Duration of Lesson: 2hr
Lesson Title: Parallel operation, commutation circuit

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Parallel operation of SCRs
2. Importance of connecting the SCRs in parallel
3. turn on and turn off (commutation) times
4. different commutation circuits

Course Objectives:

1. To provide the students a deep insight in to the working of different switching devices with respect to their characteristics
2. To analyze different converters and control with their applications

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Parallel operation ofSCRs, Mounting of SCRs when they are connected in parallel, commutation process, different methods of commutation

Assignment / Questions:
Q1. Describe parallel operation of SCRs (Obj 1, 2, out 1, 2, 3)
Q2. Explain different commutation techniques of SCRs (Obj 1, 2, out 1, 2, 3)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014 Date: 1-8-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL Year: III Section B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080

Name of the Faculty: G SWAPNA Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 9 Duration of Lesson: 2hr
Lesson Title: Phase control technique, half controlled converter with R-load

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Phase control technique
2. Operation of half controlled converter

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Phase control technique, operation of half controlled converter with R-load, derivation for average and RMS output voltage, output voltage, output current, voltage drop across thyristor waveforms, variation of output voltage with firing angle.

Assignment / Questions:
Q1. Explain the operation of single phase half wave converter using single thyristor for R load with the help of neat circuit diagram and waveform. (Obj 1,2 out 2,3)
LESSON PLAN

Academic Year : 2013-2014                         Date: 3-8-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL                          Year: III   Section B
Course/Subject: POWER ELECTRONICS                          Course Code: GR11A3080
Name of the Faculty: G SWAPNA                          Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 10                                                      Duration of Lesson: 2hr
Lesson Title: Half controlled converter with RL, RLE load

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Operation of half controlled converter with RL -load
2. Nature of current with inductive load
3. Operation of half controlled converter with RL -load

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

<table>
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<th>Operation of Half controlled converter with RL-Load, nature of current with RL-load, derivation of output current with RL load, derivation for average and RMS output voltage, output voltage , output current, voltage drop across thyristor waveforms, variation of output voltage with firing angle. Operation of half controlled converter with RL-Load, derivation and waveforms</th>
</tr>
</thead>
</table>

Assignment / Questions:
Q1. Explain the operation of single phase half wave converter using single thyristor for RL load and with the help of neat circuit diagram and waveform. (obj 2, out 2,3,5)
LESSON PLAN

Academic Year : 2013-2014 Date: 8-8-2013
Semester : I

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

Course/Subject: POWER ELECTRONICS Course Code: GR11A3080

Name of the Faculty: G SWAPNA Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 11 Duration of Lesson: 2hr
Lesson Title: Half controlled converter with RL and Free wheeling Diode

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Operation of half controlled converter with RL-load
2. Advantage of using free wheeling diode

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Operation of Half controlled converter with RL-Load, nature of current with RL-load, derivation of output current with RL load, derivation for average and RMS output voltage, output voltage, output current, voltage drop across thyristor waveforms, variation of output voltage with firing angle. Advantage of free wheeling diode

Assignment / Questions:
Q1. Explain the operation of single phase half wave converter using single thyristor for RL load and freewheeling diode, with the help of neat circuit diagram and waveform. Explain the main features of wheeling diode and its advantages (Obj 1,2, out 2,3,5)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014                                      Date: 10-8-2013
Semester : I
Name of the Program: B.Tech ELECTRICAL Year: III Section B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR
Lesson No: 12 Duration of Lesson: 2hr
Lesson Title: Performance parameters

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The performance parameters of converters
2. Transformer ratings

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

The operation of converters, the source current expression, derivation of fundamental component of input current, active and reactive power inputs to the converter, harmonic factor, form factor, ripple factor, transformer utilization factor, and displacement factor.

******************************************************************************Assignment / Questions:******************************************************************************

Q1. (a). Describe the different modes of operation of a Thyristor with the help of schematic diagram, static V-I characteristics. (b). Explain why holding current is less than latching current. (obj 2and out 2,3)

Q2. Define the i) Forward break over voltage ii) Latching current iii) Finger voltage iv) SCR turn-off time (obj2, and out 2,3)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014 Date: 17-8-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL Year: III Section B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 13 Duration of Lesson: 2hr
Lesson Title: Fully controlled converter with R-load midpoint type, Bridge type

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

1. The operation of Midpoint type converter with R-Load
2. The operation of Bridge type converter with R-Load
3. The advantages and disadvantages of Midpoint type and bridge type converters

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Operation of Full controlled Midpoint type and Bridge type converter with R-Load, derivation for average and RMS output voltage, output voltage, output current, voltage drop across thyristor waveforms, variation of output voltage with firing angle. Advantage of bridge type converter over Midpoint type converter.

Assignment / Questions:
Q1. Describe the operation of a single phase two-pulse mid-point converter for R-load with relevant voltage and current waveforms. Discuss how each SCR is subjected to a reverse voltage equal to double the supply voltage, in case of turns ratio from primary to each secondary is unity (Obj 2,3 out 2,3)
LESSON PLAN

Academic Year : 2013-2014       Date: 22-8-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL       Year: III       Section B
Course/Subject: POWER ELECTRONICS       Course Code: GR11A3080
Name of the Faculty: G SWAPNA       Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 14       Duration of Lesson: 2hr
Lesson Title: Fully controlled converter with RL-load midpoint type, Bridge type

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The operation of Midpoint type converter with RL-Load
2. The operation of Bridge type converter with RL-Load

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES
TEACHING POINTS :

Operation of Full controlled Mid point type and bridge type converter with RL-Load, derivation for average and RMS output voltage, output voltage , output current, voltage drop across thyristor waveforms, variation of output voltage with firing angle.

Assignment / Questions:

Q1. Explain the operation of a three phase fully controlled bridge converter with inductive load. Draw the voltage and current waveforms for 70°. List the firing sequence of SCRs

Q2. Derive expressions for following for a single phase full wave mid-point converter for RL load

( obj 1,2 & out 2,3)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014    Date: 24-8-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL    Year: III    Section B
Course/Subject: POWER ELECTRONICS    Course Code: GR11A3080

Name of the Faculty: G SWAPNA    Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 15    Duration of Lesson: 2hr

Lesson Title: Full controlled converters with RLE load and free-wheeling diode

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The operation of Midpoint type converter with RLE-Load
2. The operation of Bridge type converter with RLE-Load
3. The operation of Bridge type converter with RLE-Load and Freewheeling diode

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Operation of Full controlled Mid point type and bridge type converter with RLE-Load and free wheeling diode, derivation for average and RMS output voltage, output voltage, output current, voltage drop across thyristor waveforms, variation of output voltage with firing angle

Assignment / Questions:
Q1. Derive expressions for following for a single phase full wave mid-point converter for RLE load and freewheeling diode (Obj 1, 2 out 2,3)

Average load voltage ii) average load current and iii) rms load voltage

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014 Date: 29-8-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL Year: III Section B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 16 Duration of Lesson: 2hr
Lesson Title: Active and Reactive power input, effect of source inductance

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The performance parameters of converters
2. Effect of source inductance on the performance of converter.

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

The operation of converters, the source current expression, derivation of fundamental component of input current, active and reactive power inputs to the converter, harmonic factor, form factor, ripple factor, transformer utilization factor, and displacement factor, Effect of source inductance on the performance of full controlled converters.

Assignment / Questions:

Q1. Derive the expression for the following performance factors of a single phase fully controlled bridge converter. i) input displacement factor ii) input power factor iii) d.c. voltage ratio iv) input harmonic factor and v) voltage ripple factor (obj 2,3 out 2,3 )

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014         Date: 5-9-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL        Year: III   Section B
Course/Subject: POWER ELECTRONICS        Course Code: GR11A3080
Name of the Faculty: G SWAPNA        Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 18         Duration of Lesson: 2hr
Lesson Title: Three phase bridge type converter with R-Load, phase bridge type converter with RL-Load

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Introduction to three phase converters
2. Operation of three phase bridge type converter with R-Load
3. Operation of three phase bridge type converter with RL-Load

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Introduction to three phase converters, difference between line and phase voltages, operation of three phase bridge type converter with R-load, line and phase voltages, output voltage waveforms, derivation of average and RMS output voltages.
Operation of three phase bridge type converter with R-load, line and phase voltages, output voltage waveforms, derivation of average and RMS output voltages.

Assignment / Questions:
Q1. Explain the operation of three phase half wave converter with resistance R, with circuit diagram. Sketch the associated waveforms also. (Obj 1,2 out 2,3)

Signature of faculty
Academic Year : 2013-2014                          Date: 7-9-2013

Semester :    I

Name of the Program: B.Tech ELECTRICAL                Year: III  Section B
Course/Subject:  POWER ELECTRONICS                      Course Code: GR11A3080
Name of the Faculty: G SWAPNA                           Dept: EEE.

Designation :  ASST.PROFESSOR

Lesson No: 19                                          Duration of Lesson: 2hr
Lesson Title: Effect of source inductance the performance of three phase bridge converter

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The effect of source inductance on the performance of bridge converter.

Course Objectives:

1. To analyze different converters and control with their applications

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Operation of three phase bridge inverter when the source inductance is considered, commutation angle, overlap period.

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014               Date: 12-9-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS               Course Code: GR11A3080

Name of the Faculty: G SWAPNA              Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 20                             Duration of Lesson: 2hr

Lesson Title: Dual converters

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. understand the principle of operation of dual converters
2. importance of Dual converters
3. The applications of Dual converters

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

The basics of dual converters, circuit diagram, circulating current type and Non-circulating current type dual converters, different modes of operation of Motor using Dual converters

Assignment / Questions:

Q1. Explain the operation of circulating current type Dual converters (obj1,2 & out 2,3)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014               Date: 14-9-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS               Course Code: GR11A3080

Name of the Faculty: G SWAPNA               Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 21               Duration of Lesson: 2hr

Lesson Title: ACVC with R-load, RL-load

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Principle of operation of AC voltage controllers
2. AC voltage controller with R-Load
3. AC voltage controller with RL-Load
4. Applications of AC Voltage controllers

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

AC voltage controllers using Thyristors, operation of ACVC with R-Load, RL-load waveforms for output voltage, gate pulses, load current, voltage drop across Thyristors, derivation of average and RMS values of output voltage, applications of AC Voltage controllers.

Assignment / Questions:
Q1 For a single phase AC voltage controller feeding resistance load, draw waveforms of supply voltage, gating signals, output voltage, source and output current and voltage across SCRs. Describe its working with reference to the waveforms drawn, with neat circuit diagram (Obj 2,3 out 2,5,6)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014    Date: 19-9-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS    Course Code: GR11A3080

Name of the Faculty: G SWAPNA    Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 22    Duration of Lesson: 2hr

Lesson Title: Triac with R and RL loads, Step down cyclo-converter with R-load

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The structure of Triac, Modes of operation of Triac
2. Principle of operation of cyclo-converter
3. Operation of step down cyclo-converter with R-load

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Construction of Triac, symbol, terminals, operation of Triac with the help of characteristics,
Principle of operation of cyclo converters, classification of cyclo converters, operation of mid
point type and bridge type step down cyclo converter with R-Load for different frequencies,
wave forms for output voltage and current

Assignment / Questions:

Q1. Describe the principle of working of a single phase midpoint type cyclo-converter with R-load with the help of neat circuit diagram and waveforms (Obj 2,3 out 2,5,6)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014  
Date: 21-9-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL  
Year: III  
Course/Subject: POWER ELECTRONICS  
Course Code: GR11A3080

Name of the Faculty: G SWAPNA  
Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 23  
Duration of Lesson: 2hr
Lesson Title: Step down cycloconverter with RL-load continuous and discontinuous

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. understand the principle of operation of step down cyclo converter with RL Load
2. continuous and discontinuous modes of operation

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

- operation of mid point type and bridge type step down cyclo converter with RL-Load for different frequencies, explanation of continuous and discontinuous modes of operation, waveforms for output voltage and current

Assignment / Questions:

Q1 Describe the principle of working of a single phase bridge type cyclo-converter for both continuous and discontinuous conduction with the help of neat circuit diagram and waveforms (Obj 2,3 out 2,6)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014      Date: 26-9-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS     Course Code: GR11A3080

Name of the Faculty: G SWAPNA     Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 24      Duration of Lesson: 2hr
Lesson Title: Step up cyclo converter

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. The principle of operation of step down cyclo converter
2. Operation of step down cyclo for different frequencies

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Principle of operation of step up cyclo converter, operation of cyclo converter for different frequencies with relevant waveforms.

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014           Date: 3-10-2013

Semester : I

Name of the Program: B.Tech ELECTRICAL         Year: III   Section B
Course/Subject: POWER ELECTRONICS             Course Code: GR11A3080
Name of the Faculty: G SWAPNA            Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 26                           Duration of Lesson: 2hr
Lesson Title: Time ratio control, current limit control strategies

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Understand the different control strategies of DC voltage
2. Time ratio control and frequency limit control strategies

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Different types of DC –DC converters, step up and step down choppers, time ratio control and frequency limit control strategies

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014  Date: 5-10-2013
Semester : I
Name of the Program: B.Tech ELECTRICAL  Year: III  Section B
Course/Subject: POWER ELECTRONICS  Course Code: GR11A3080
Name of the Faculty: G SWAPNA  Dept: EEE.
Designation : ASST.PROFESSOR
Lesson No: 27  Duration of Lesson: 2hr
Lesson Title: Step down chopper, derivation of load voltage

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Principle of step down chopper
2. Operation of chopper

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Principle of operation of step down chopper with relevant waveforms

Assignment / Questions:
Q1. Explain the operation of step down chopper with the help of waveforms. (obj 2, out 2,5,7)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014       Date: 10-10-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL         Year: III   Section B
Course/Subject: POWER ELECTRONICS              Course Code: GR11A3080
Name of the Faculty: G SWAPNA                  Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 28                               Duration of Lesson: 2hr
Lesson Title: Morgan’s chopper, step up chopper

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. understand the operation of Morgan’s chopper
2. Operation of step up chopper

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Review of choppers, operation of Morgan’s chopper, and operation of step up chopper with relevant waveforms

Assignment / Questions:
Q1. Discuss the working of a Morgan’s chopper circuit and its commutation procedure with the help of neat circuit diagram (Obj 2, out 2,5,7)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014                                  Date: 12-10-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL                   Year: III   Section B
Course/Subject: POWER ELECTRONICS                        Course Code: GR11A3080
Name of the Faculty: G SWAPNA                              Dept: EEE.
Designation    :  ASST.PROFESSOR
Lesson No: 29                                            Duration of Lesson: 2hr
Lesson Title: Jone’s chopper, oscillation chopper

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Working of Jone’s chopper
2. Working of Oscillatory chopper

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS           : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS     : 

Working of Jone’s chopper, Oscillatory chopper with the help of circuit diagram and waveforms.

Assignment / Questions:
Q1. Explain the operation of an Oscillation d.c. chopper circuit and its commutation process with the help of neat circuit diagram and necessary waveforms (Obj 2,3 out 2,3)
Q2. Explain the operation of D.C. jones chopper with its commutation procedure by sketching circuit diagram and necessary waveforms (Obj 2,3 out 2,7)
LESSON PLAN

Academic Year : 2013-2014 Date: 24-10-2013

Semester : I

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

Course/Subject: POWER ELECTRONICS Course Code: GR11A3080

Name of the Faculty: G SWAPNA Dept: EEE.

Designation : ASST.PROFESSOR

Lesson No: 30 Duration of Lesson: 2hr

Lesson Title: Single phase inverter, Basic series inverter

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be able to:
1. Principle of operation of Inverter
2. Operation of Basic series inverter
3. Operation of single phase inverter

Course Objectives:
1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

The principle of operation of inverter, working of basic series inverter, single phase inverter with waveforms, applications of inverters.

Assignment / Questions:

Q1. Explain the operation of a single phase bridge inverter for RL loads with the help of neat circuit diagram and necessary waveforms (obj 2,3, out 2,7)

Signature of faculty
LESSON PLAN

Academic Year : 2013-2014  Date: 26-10-2013
Semester : I

Name of the Program: B.Tech ELECTRICAL  Year: III  Section B
Course/Subject: POWER ELECTRONICS  Course Code: GR11A3080
Name of the Faculty: G SWAPNA  Dept: EEE.
Designation : ASST.PROFESSOR

Lesson No: 31  Duration of Lesson: 2hr
Lesson Title: Parallel capacitor inverter, bridge inverter

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. understand the operation of Parallel capacitor inverter
2. Operation of bridge inverter

Course Objectives:

1. To analyze different converters and control with their applications
2. To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS : BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS :

Review of series inverter, working of parallel capacitor inverter, operation of Bridge inverter.

Assignment / Questions:
Q1. Discuss the operation of Mc Murray inverter with the help of circuit diagram and necessary waveforms (obj 2,3 out 2,7)

Signature of faculty
LESSON PLAN

Academic Year: 2013-2014  Date: 31-10-2013

Semester: I

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

Course/Subject: POWER ELECTRONICS  Course Code: GR11A3080

Name of the Faculty: G SWAPNA  Dept: EEE.

Designation: ASST.PROFESSOR

Lesson No: 32  Duration of Lesson: 2hr

Lesson Title: Voltage control techniques for PWM

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Voltage control techniques for inverter
2. Different types of PWM techniques

Course Objectives:
   To study advanced converters and switching techniques implemented in recent technology

TEACHING AIDS: BOARD, MARKER, DUSTER, SLIDES

TEACHING POINTS:

Different types of PWM techniques, trapezoidal PWM technique, Sinusoidal PWM, explanation of variation of DC voltage with the variation of Pulse Width with the help of waveforms.

Assignment / Questions:
Q1. Discuss various voltage control techniques for single phase bridge inverter with the help of signal waveforms for each of the technique (Obj 2,3 out 1,7)

Signature of faculty
ASSIGNMENT SHEET – 1

Academic Year : 2013-2014
Semester : I
Name of the Program: B.Tech ELECTRICAL Year: III Section: B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

This Assignment corresponds to Unit No.1 / Lesson 1,2,3,4,6

Objective Nos.: 1
Outcome Nos. 1
Q1. (a). Describe the different modes of operation of a Thyristor with the help of schematic diagram, static V-I characteristics.
(b). Explain why holding current is less than latching current.
Q2. Describe the various modes of operation of Power MOSFET with the help of its Circuit diagram and static V-I characteristics and transfer characteristics. Explain how Power MOSFET can be turned-on and turned-off.
Q3. Define the i) Forward break over voltage ii) Latching current iii) Finger voltage iv) SCR turn-off time.
Q4. a) Explain the following thermal ratings of SCRs
i) Junction temperature ii) Transient thermal resistance
b) What are dv/dt and di/dt ratings of SCRs? What happens if there ratings are exceeded?
Q5.(a) Explain the operation of series connected SCRs with the help of neat circuit diagram
(b) Explain two transistor model of a Thyristor and derive the expression for anode current
Q6. What are the different methods for turning-off an SCR. Explain all methods in detail with the help of waveforms and circuit diagrams?
This Assignment corresponds to Unit No.2, Lesson 9,10,11,12,14,18

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

Q7. Explain the operation of single phase half wave converter using single thyristor for RL load and freewheeling diode, with the help of neat circuit diagram and waveform. Explain the main features of wheeling diode and its advantages
Q8. Explain the operation of single phase half wave converter using single thyristor for R load and freewheeling diode, with the help of neat circuit diagram and waveform. Explain the main features of wheeling diode and its advantages
Q9. Derive the expression for the following performance factors of a single phase fully controlled bridge converter. i) input displacement factor ii) input power factor iii) d.c. voltage ratio iv) input harmonic factor and v) voltage ripple factor
Q10. Derive expressions for following for a single phase full wave mid-point converter for RL load

Average load voltage ii) average load current and iii) rms load voltage.

Q11. Describe the operation of a single phase two-pulse mid-point converter for RL loads with relevant voltage and current waveforms. Discuss how each SCR is subjected to a reverse voltage equal to double the supply voltage, in case of turns ratio from primary to each secondary is unity
Q12. Explain the operation of a three phase fully controlled bridge converter with inductive load. Draw the voltage and current waveforms for 70°. List the firing sequence of SCRs
Q13. Explain the operation of three phase half wave converter with resistance R, and inductive load with circuit diagram. Sketch the associated waveforms also.

This Assignment corresponds to Unit No.3, Lesson 21,23

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

Q14. Describe the principle of working of a single phase bridge type cyclo-converter for both continuous and discontinuous conduction with the help of neat circuit diagram and waveforms
Q15. For a single phase AC voltage controller feeding resistance load, draw waveforms of supply voltage, gating signals, output voltage, source and output current and voltage across SCRs. Describe its working with reference to the waveforms drawn, with neat circuit diagram.

This Assignment corresponds to Unit No.4, Lesson 27,28,29

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

Q16. Explain the operation of an Oscillation d.c. chopper circuit and its commutation process with the help of neat circuit diagram and necessary waveforms
Q17. Explain the operation of d.c. jones chopper with its commutation procedure by sketching circuit diagram and necessary waveforms.

Q18. Discuss the working of a Morgan’s chopper circuit and its commutation procedure with the help of neat circuit diagram.

This Assignment corresponds to Unit No.5, Lesson 30, 31, 32

Objective Nos.: 2,3
Outcome Nos.  2,3
Q19. Explain the operation of a single phase bridge inverter for RL loads with the help of neat circuit diagram and necessary waveforms
Q20. Discuss the operation of Mc Murray inverter with the help of circuit diagram and necessary waveforms
Q21. Discuss various voltage control techniques for single phase bridge inverter with the help of signal waveforms for each of the technique.

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Signature of HOD                                          Signature of faculty:

Date:
TUTORIAL SHEET - 1

Academic Year                        : 2013-2014

Semester                                       :    I

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

Course/Subject:  POWER ELECTRONICS                                      Course Code: GR11A3080

Name of the Faculty: G SWAPNA                                                  Dept: EEE.

Designation    :  ASST.PROFESSOR

This Tutorial corresponds to Unit No.1/ Lesson 2,7,8

Q1. A bipolar Transistor has a current gain $\beta =40$. He load resistance $R_c = 10\, \text{ohm}$, d supply voltage $V_{cc}$ = 130v and input voltage to base circuit $V_b = 10\, \text{v}$. for $V_{ces} =1\, \text{v}$ and $V_{bes} = 1.5\, \text{v}$ calculate

a) The value of $R_b$ for operation in saturated state

b) Forced current gain

Q2. An SCR is to be gated by using a relaxation oscillator which has a UJT with the characteristics , $\eta= 0.7$, $I_p = 0.7\, \text{mA}$, $V_p = 16.5\, \text{V}$, normal leakage current with emitter open= $37\, \text{mA}$, $V_v = 1.0\, \text{v}$, $I_v = 6\, \text{mA}$ and $R_{b1b2} = 5.5$. the firing frequency as 1000Hz. If $C= 0.1\, \text{u}$ Calculate the values of $R$, $R_1$ and $R_2$.

Q3. The SCRs are used in a string to withstand a dc voltage of 12kv. The maximum leakage current and recovery charge difference of SCRs is $10\, \text{mA}$ and $59\, \text{mc}$ respectively. The value of $R$ for steady state equalizing circuit is $40\, \text{kohm}$ and value of $C$ of dynamic equalizing circuit is $0.2\, \text{uf}$. Find the steady state and transient voltage derating factor

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, 2,3

Outcome Nos.: 1,2,3

Signature of HOD        Signature of faculty

Date:          Date:
TUTORIAL SHEET - 1

Academic Year : 2013-2014

Semester : I

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

Course/Subject: POWER ELECTRONICS  
Course Code: GR11A3080

Name of the Faculty: G SWAPNA  
Dept: EEE.

Designation : ASST.PROFESSOR

This Tutorial corresponds to Unit No.2/ Lesson 9,10,12,14,18

Q1. A resistance load of 10ohm is connected through a single phase half wave SCR circuit on 220V, 50 Hz supply. Calculate power delivered to the load for a firing angle of 75°. Find also the value of input power factor.

Q2. A single phase half wave rectifier is operated from 230V, 50 Hz supply, and load resistance R=10ohm, calculate the average and RMS value of output voltage for firing angle 45°.

Q3. A single phase load of resistance 12ohm in series with an Inductance of 24 mH is fed from a 230V(rms), 50Hz supply by a Full controlled Midpoint type converter. Find mean power in the load at firing angles of i) 0° ii) 45°  
Ignore source inductance and device voltage drops.

Q4. A resistance load of 10ohm is connected through a single phase half wave SCR circuit on 220V, 50 Hz supply. Calculate power delivered to the load for a firing angle of 75°. Find also the value of input power factor.

Q5. A single phase fully controlled bridge converter is supplied with 230 V, 50 Hz source. The load consists of 20Q and a large inductance so as to reach the load current constant. For a delay angle of 60°. determine 1) average output voltage ii) average output current iii) average values of SCR current and iv) input power factor

Q6. A 3-phase half wave converter is supplying a load with a continuous constant current of 50 A over a firing angle from 0 deg to 60 deg. What will be the power dissipated by the load at these limiting values of firing angle. The supply voltage is 415v line.
A three phase full converter is operated from a three phase star connected 220V, 50 Hz supply. The load current is continuous and has negligible ripple. The average load current is $I_{dc} = 150$A and commutating inductance per phase is 0.5mH. Determine the overlap angle if

(a) $\alpha = \frac{\pi}{6}$
(b) $\alpha = \frac{\pi}{3}$

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, 2, 3
Outcome Nos.: 2, 3

Signature of HOD
Date:

Signature of faculty
Date:
TUTORIAL SHEET - 1

Academic Year : 2013-2014
Semester : I

Name of the Program: B.Tech ELECTRICAL Year: III Section: B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

This Tutorial corresponds to Unit No.3 / Lesson 25

Q1. A single phase load of resistance 12ohm in series with an Inductance of 24 mH is fed from a 230V(rms), 50Hz supply by a pair of inverse parallel thyristors. Find mean power in the load at firing angles of i) 0° ii) 60° and iii) 135°. Ignore source inductance and device voltage drops.

Q2. Two SCRs are connected back to back have load resistance of 400 ohms and a supply of 230V ac. If firing angle 60°, find
   
   (a) the RMS output voltage
   (b) The average output voltage

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.: 6

Signature of HOD Signature of faculty
Date: Date:
Q1. Simple DC chopper is operating at a frequency of 2 kHz from a 110v dc source to supply a load resistance of 10ohm. The load time constant is 6ms. If the average load voltage is 57.9V. Find the period of chopper, the average load current and the magnitude of the ripple current.

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.: 7
EVALUATION STRATEGY

Academic Year : 2013-2014
Semester : I
Name of the Program: B.Tech ELECTRICAL Year: III Section: B
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

1. TARGET:
   A) Percentage for pass: 40%
   b) Percentage of class: 85%

2. COURSE PLAN & CONTENT DELIVERY

   (Please write how you intend to cover the contents: i.e., coverage of Units/Lessons by lectures, design, exercises, solving numerical problems, demonstration of models, model preparation, experiments in the Lab., or by assignments, etc.)

3. METHOD OF EVALUATION

   3.1 ☐ Continuous Assessment Examinations (CAE-I, CAE-II)
   3.2 ☐ Assignments
   3.3 ☐ Quiz
   3.4 ☐ Semester/End Examination

4. List out any new topic(s) or any innovation you would like to introduce in teaching the subjects in this Semester.

   ...........................................................................................................................................................................

Signature of HOD                        Signature of faculty
Date:                                      Date:
RESULT ANALYSIS

Academic Year : 2013-2014
Semester : I
Name of the Program: B.Tech ELECTRICAL Year: III
Course/Subject: POWER ELECTRONICS Course Code: GR11A3080
Name of the Faculty: G SWAPNA Dept: EEE.
Designation : ASST.PROFESSOR

<table>
<thead>
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<th>Academic Year</th>
<th>Total No. of students appeared</th>
<th>No. of students passed</th>
<th>No. of students failed</th>
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<td>84.61%</td>
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</table>

Signature of HOD        Signature of faculty
Date:          Date: