Jawaharlal Nehru Engineering College

SPEM Laboratory Manual

For

Third Year Students

Manual made by

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LABORATORY MANNUAL CONTENTS

This manual is intended for the third year students of Electrical Engineering in the subject of Special purpose electrical machines.

Students are advised to thoroughly go through this manual rather than only topics mentioned in the syllabus as practical aspects are the key to understanding and conceptual visualization of theoretical aspects covered in the books.

Good Luck for your Enjoyable Laboratory Sessions

Prof. Suradkar Rohini

FOREWORD

It is my great pleasure to present this laboratory manual for third year engineering students for the subject of Special Purpose Electrical Machines Keeping in view the vast coverage required for visualization of concepts of Special purpose electrical machines with simple language.

As a student, many of you may be wondering with some of the questions in your mind regarding the subject and exactly what has been tried is to answer through this manual.
Faculty members are also advised that covering these aspects in initial stage itself, will greatly relived them in future as much of the load will be taken care by the enthusiasm energies of the students once they are conceptually clear.

Prof. Dr. S.D.Deshmukh

Principal

SUBJECT INDEX

1. DOs and DON'T DOs in Laboratory :

DOs and DON'T DOs in Laboratory:

1. Understand the equipment to be tested and apparatus to be used.

2. Select proper type (i .e. A. C. or D. C.) and range of meters.

3. Do not touch the live terminals.

4. Use suitable wires (type and size).

5. All the connection should be tight.

1. Do not leave loose wires (i .e. wires not connected).

2. Get the connection checked before switching 'ON' the supply.

3. Never exceed the permissible values of current, voltage, and / or speed of any machine, apparatus, wire, load, etc.

4. Switch ON or OFF the load gradually and not suddenly.

5. Strictly observe the instructions given by the teacher/Lab Instruct or

Instruction for Laboratory Teachers:

1. Submission related to whatever lab work has been completed should be done during the next lab session.

2. Students should be guided and helped whenever they face difficulties.

3. The promptness of submission should be encouraged by way of marking and evaluation patterns that will benefit the sincere students.

2. Lab Exercises:

Exercise No1: (2 Hours) – 1 Practical

Load characteristics of variable reluctance motor.

Aim: To study Load characteristics of variable reluctance motor

Apparatus: Variable Reluctance Motor (VRM), load, Voltmeters & Ammeters.

Theory:

1. Introduction of Variable Reluctance Motor (VRM).

2. Construction of Variable Reluctance Motor (VRM).

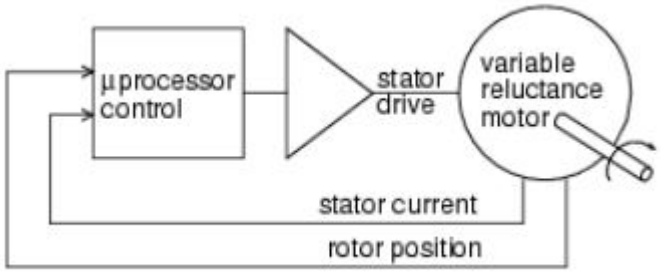
3. Working principle of VRM.

4. Advantages of VRM.

5. Disadvantages of VRM.

6. Applications of VRM

Circuit Diagram:



Electronic driven variable reluctance motor.

Conclusion: Hence we have studied Variable Reluctance Motor (VRM)

Exercise No 2: (2 Hours) – 1 Practical

Load characteristics of Stepper motor

Aim: To study Load characteristics of Stepper motor.

Apparatus: Stepper motor, load, Voltmeters & Ammeters.

Theory:

1. Introduction of Stepper motor.

2. Construction of Stepper motor.

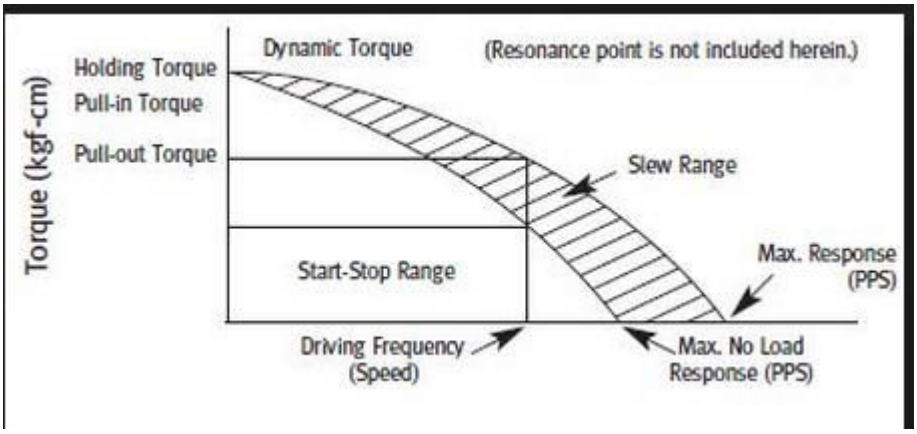
3. Types of Stepper motor.

4. Advantages of Stepper motor.

5. Disadvantages of Stepper motor.

6. Applications of Stepper motor.

Characteristics of Stepper motor:



Conclusion: Hence we have studied Stepper motor.

Exercise No 3 : (2 Hours) – 1 Practical

Load characteristics of Brushless DC motor.

Aim: To study Load characteristics of Brushless DC motor.

Apparatus: Brushless DC motor, load, Voltmeters & Ammeters.

Theory:

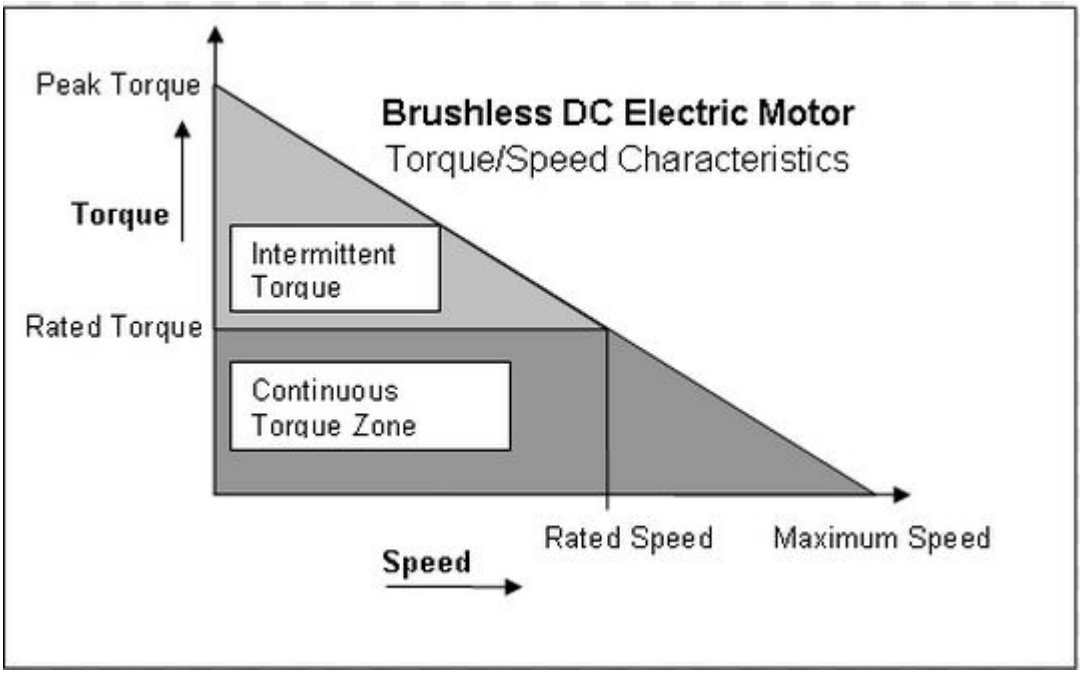
1. Introduction of Brushless DC motor.

2. Construction of Brushless DC motor.

3. Operating principle of Brushless DC motor.

4. Applications of Brushless DC motor.

Characteristics of Brushless DC motor:



Conclusion: Hence we have studied Brushless DC motor.

Exercise No 4 : (2 Hours) – 1 Practical

Load characteristics of FHP Synchronous motor.

Aim: To Study Load characteristics of FHP Synchronous motor.

Apparatus: FHP Synchronous motor, load, Voltmeters & Ammeters.

Theory:

1. Introduction of FHP Synchronous motor

2. Construction of FHP Synchronous motor

3. Working principle of FHP Synchronous motor

4. Advantages of FHP Synchronous motor.

5. Disadvantages of FHP Synchronous motor.

6. Applications of FHP Synchronous motor.

Characteristics of FHP Synchronous motor.

Conclusion: Hence we have studied FHP Synchronous motor.

Exercise No 5: (2 Hours) – 1 Practical

Load characteristics of PMDC motor

Aim: To Study Load characteristics of PMDC motor

Apparatus: PMDC motor, load, Voltmeters & Ammeters.

Theory:

1. Introduction of PMDC motor.

2. Construction of PMDC motor.

3. Working principle of PMDC motor

4. Advantages of PMDC motor.

5. Disadvantages of PMDC motor.

6.Applications of PMDC motor.

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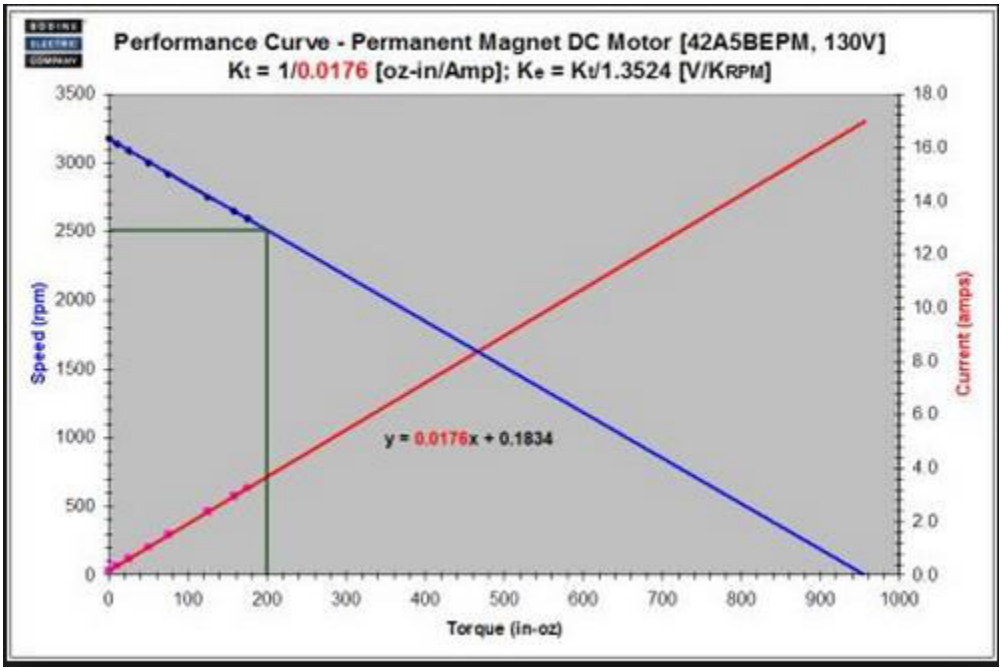
Characteristics of PMDC motor :



Conclusion:-Hence we have studied the characteristics of PMDC motor

Exercise No 6: (2 Hours) – 1 Practical

Input V/I characteristics of single phase arc welding transformer

Aim: To study Input V/I characteristics of single phase arc welding transformer

Apparatus: Single Phase Arc welding Transformer, Voltmeters & Ammeters.

Theory:

- Explain construction and working of Arc welding Transformer.
- Explain advantages and disadvantages of Arc welding Transformer
- Give the applications of Arc welding Transformer.
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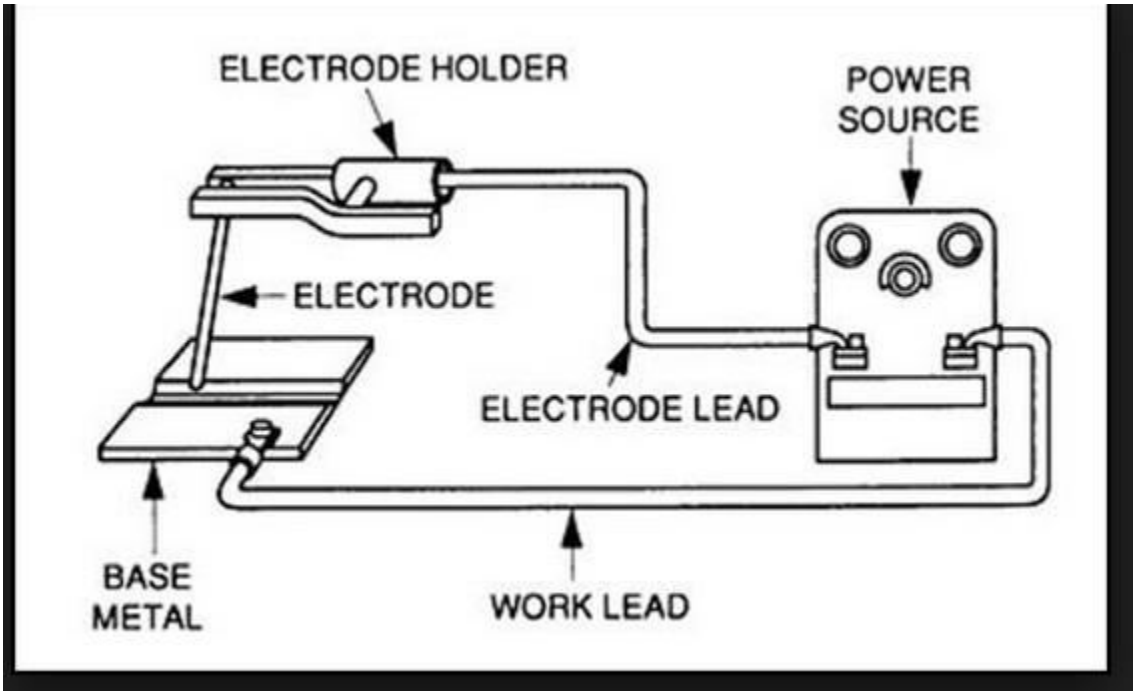
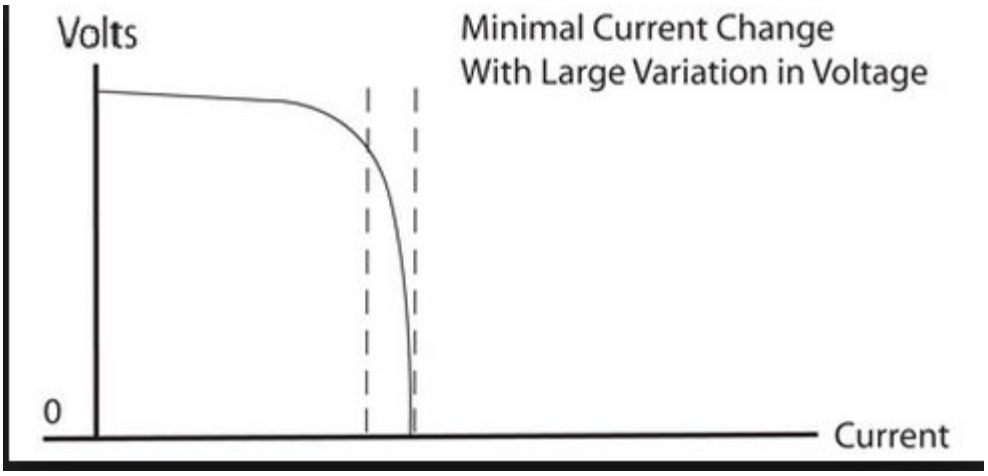
Circuit diagram of Arc welding Transformer.



Input V/I characteristics of single phase arc welding transformer



Conclusion: Hence we have studied the Arc welding Transformer.

Exercise No 7: (2 Hours) – 1 Practical

Study of construction and operation of MIG welding transformer

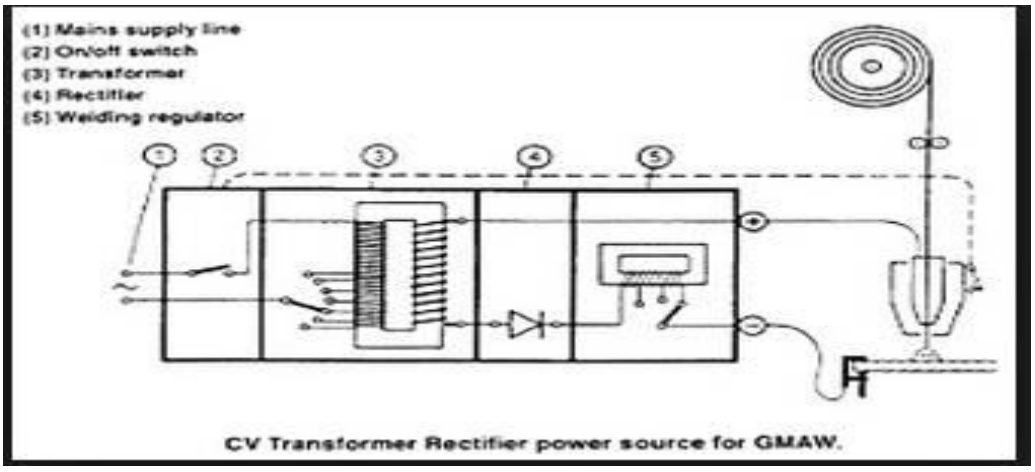
Aim: To Study construction and operation of MIG welding transformer

Apparatus: MIG welding transformer

Theory:

- Explain construction and working of MIG welding transformer
- Explain advantages and disadvantages of MIG welding transformer
- Give the applications of MIG welding transformer.

Circuit diagram of MIG welding Transformer.



Conclusion: - Hence we have studied construction and working of MIG welding transformer

Exercise No 8: (2 Hours) – 1 Practical

Study of construction and operation of TIG welding transformer

Aim: To Study construction and operation of TIG welding transformer

Apparatus: TIG welding transformer

Theory:

- Explain construction and working of TIG welding transformer
- Explain advantages and disadvantages of TIG welding transformer
- Give the applications of TIG welding transformer.

Conclusion: - Hence we have studied construction and working of TIG welding transformer

3.Conduction of Viva-Voce Examinations:

Teacher should take oral exams of the students with full preparation. Normally, the objective questions with guess are to be avoided. To make it meaningful, the questions should be such that depth of the students in the subject is tested Oral examinations are to be conducted in co-cordial environment amongst the teachers taking the examination. Teachers taking such examinations should not have ill thoughts about each other and courtesies should be offered to each other in case of difference of opinion, which should be critically suppressed in front of the students.

4.Evaluation and marking system:

Basic honesty in the evaluation and marking system is absolutely essential and in the process impartial nature of the evaluator is required in the examination system to become popular amongst the students. It is a wrong approach or concept to award the students by way of easy marking to get cheap popularity among the students to which they do not deserve. It is a primary responsibility of the teacher that right students who are really putting up lot of hard work with right kind of intelligence are correctly awarded.