BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB (20A02101P)

PREPARED BY

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VEMU IT

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

VEMU INSTITUTE OF TECHNOLOGY

DEPT.OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION OF THE INSTITUTE

- To be a premier institute for professional education producing dynamic and vibrant force of technocrats with competent skills, innovative ideas and leadership qualities to serve the society with ethical and benevolent approach.

MISSION OF THE INSTITUTE

- To create a learning environment with state-of-the art infrastructure, well equipped laboratories, research facilities and qualified senior faculty to impart high quality technical education.
- To facilitate the learners to foster innovative ideas, inculcatecompetent research and consultancy skills through Industry-Institute Interaction.
- To develop hard work, honesty, leadership qualitiesand sense of direction in rural youth by providing value based education.

VISION OF THE DEPARTMENT

- To produce professionally deft and intellectually adept Electrical and Electronics Engineers and equip them with the latest technological skills, research & consultancy competencies along with social responsibility, ethics, Lifelong Learning and leadership qualities.

MISSION OF THE DEPARTMENT

- To produce competent Electrical and Electronics Engineers with strong core knowledge, design experience & exposure to research by providing quality teaching and learning environment.
- To train the students in emerging technologies through state - of - the art laboratories and thus bridge the gap between Industry and academia.
- To inculcate learners with interpersonal skills, team work, social values, leadership qualities and professional ethics for a holistic engineering professional practice through value based education.

PROGRAM EDUCATIONAL OBJECTIVES(PEOs)

Programme Educational Objectives (PEOs) of B.Tech (Electrical and Electronics Engineering) **program are:**

Within few years of graduation, the graduates will

PEO 1: Provide sound foundation in mathematics, science and engineering fundamentals to analyze, formulate and solve complex engineering problems.

PEO 2: Have multi-disciplinary Knowledge and innovative skills to design and develop Electrical & Electronics products and allied systems.

PEO 3: Acquire the latest technological skills and motivation to pursue higher studies leading to research.

PEO 4: Possess good communication skills, team spirit, ethics, modern tools usage and the life-long learning needed for a successful professional career.

PROGRAM OUTCOMES (POs)

PO-1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO-3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO-4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO-5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO-6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO-7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO-8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO-9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO-10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO-11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO-12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

On completion of the B.Tech. (Electrical and Electronics Engineering) degree, the graduates will be able to

PSO-1:Higher Education: Apply the fundamental knowledge of Mathematics, Science, Electrical and Electronics Engineering to pursue higher education in the areas of Electrical Circuits, Electrical Machines, Electrical Drives, Power Electronics, Control Systems and Power Systems.

PSO-2:Employment: Get employed in Public/Private sectors by applying the knowledge in the domains of design and operation of Electronic Systems, Microprocessor based control systems, Power systems, Energy auditing etc.

COURSE OUTCOMES

CO	Description
C119.1	**Analyze** and verify the Kirchhoff's laws and Superposition Theorem
C119.2	**Analyze** the various characteristics on DC Machines y conducting various tests
C119.3	**Analyze** the I-V Characteristics of PV Cell
C119.4	**Apply** the knowledge to perform various tests on 1-phase transformer

LIST OF EXPERIMENTS

1) Verification of Kirchhoff's Laws
2) Verification of Superposition Theorem
3) Magnetizing characteristics of a DC Shunt Generator
4) Speed control of DC shunt Motor
5) OC & SC test of 1-phase Transformer
6) I-V Characteristics of Solar PV cell
7) Brake test on DC shunt Motor

Additional Experiments

1) Maximum Power Transfer Theorem
2) Analysis Of RL & RC Circuits For Pulse Excitation

VERIFICATION OF KIRCHHOFF'S LAWS

1) Kirchhoff's Current Law (KCL):

This law states that the algebraic sum of currents meeting at a junction or a node in a circuit is zero.

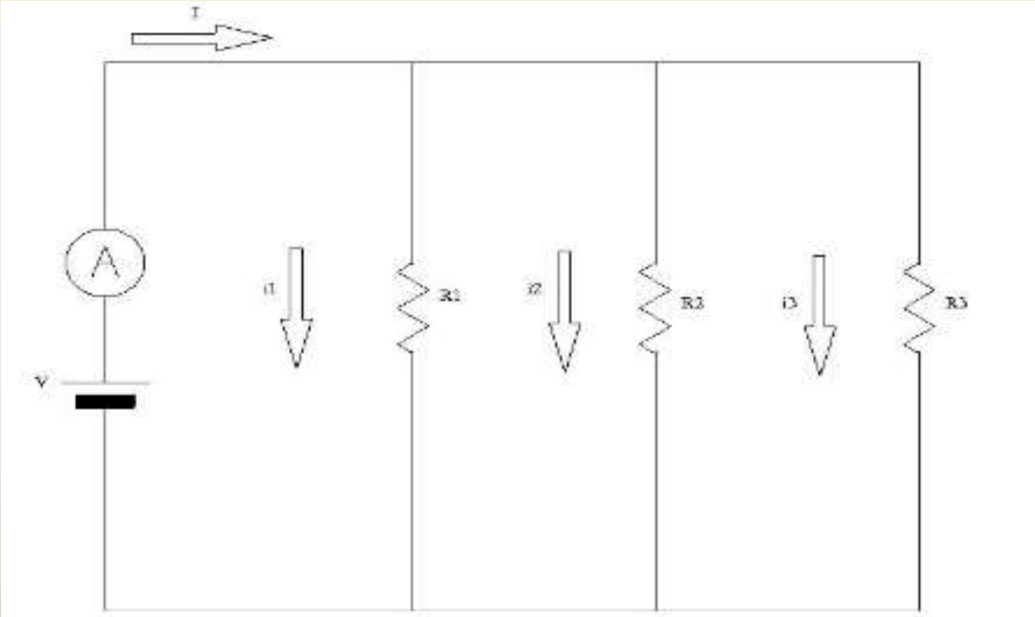


Figure 2: Node circuit

VERIFICATION OF KIRCHHOFF'S LAWS

2) Kirchhoff's Voltage Law (KVL):

KVL states that at any instant of time the algebraic sum of voltages in a closed loop is zero.

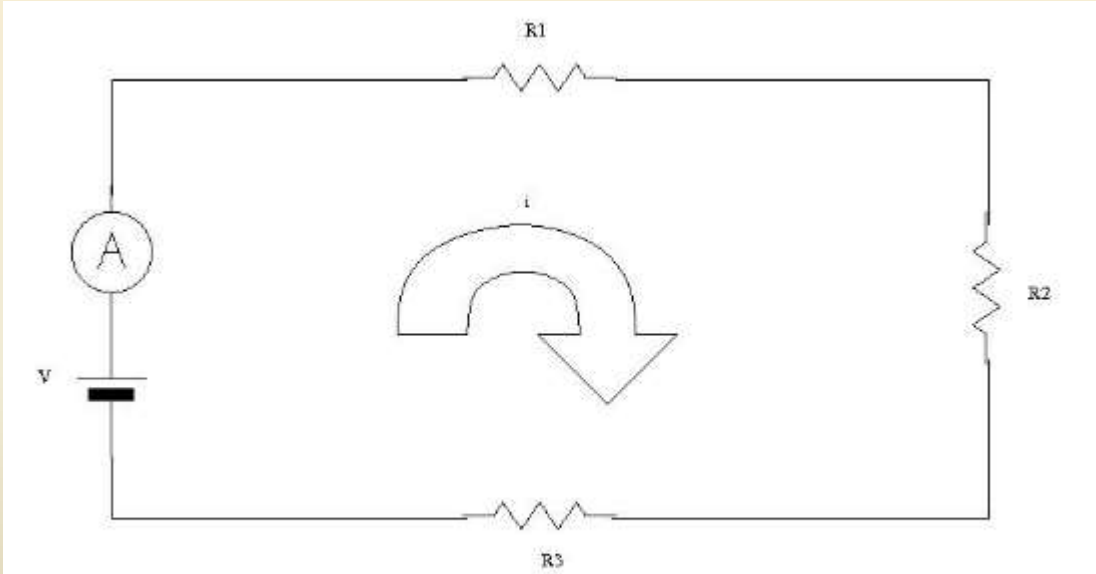


Figure 1: Loop circuit

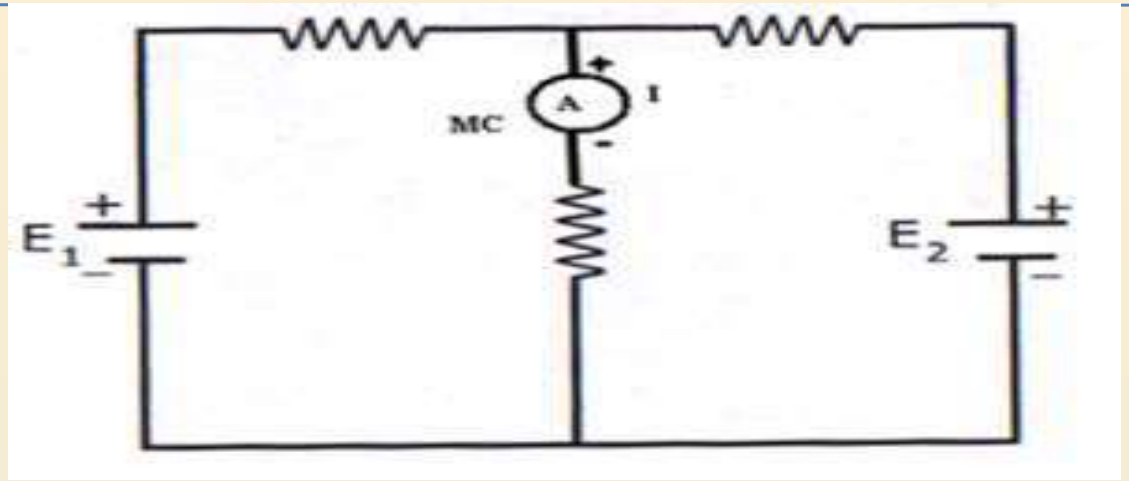
VERIFICATION OF SUPERPOSITION THEOREM

SUPERPOSITION THEOREM STATEMENT:-

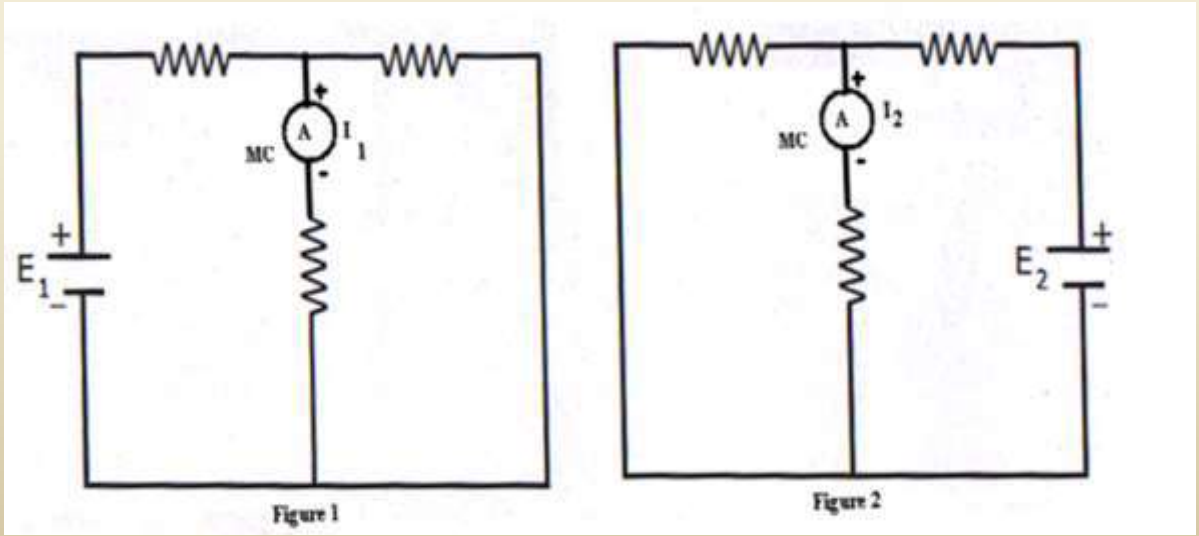
The superposition theorem states that in a linear network containing more than one source, the current flowing in any branch is the algebraic sum of currents that would have been produced by each source taken separately, with all the other sources replaced by their respective internal resistances.

In case the internal resistance of a source is not provided, the voltage sources will be short circuited and current sources will be open circuited.

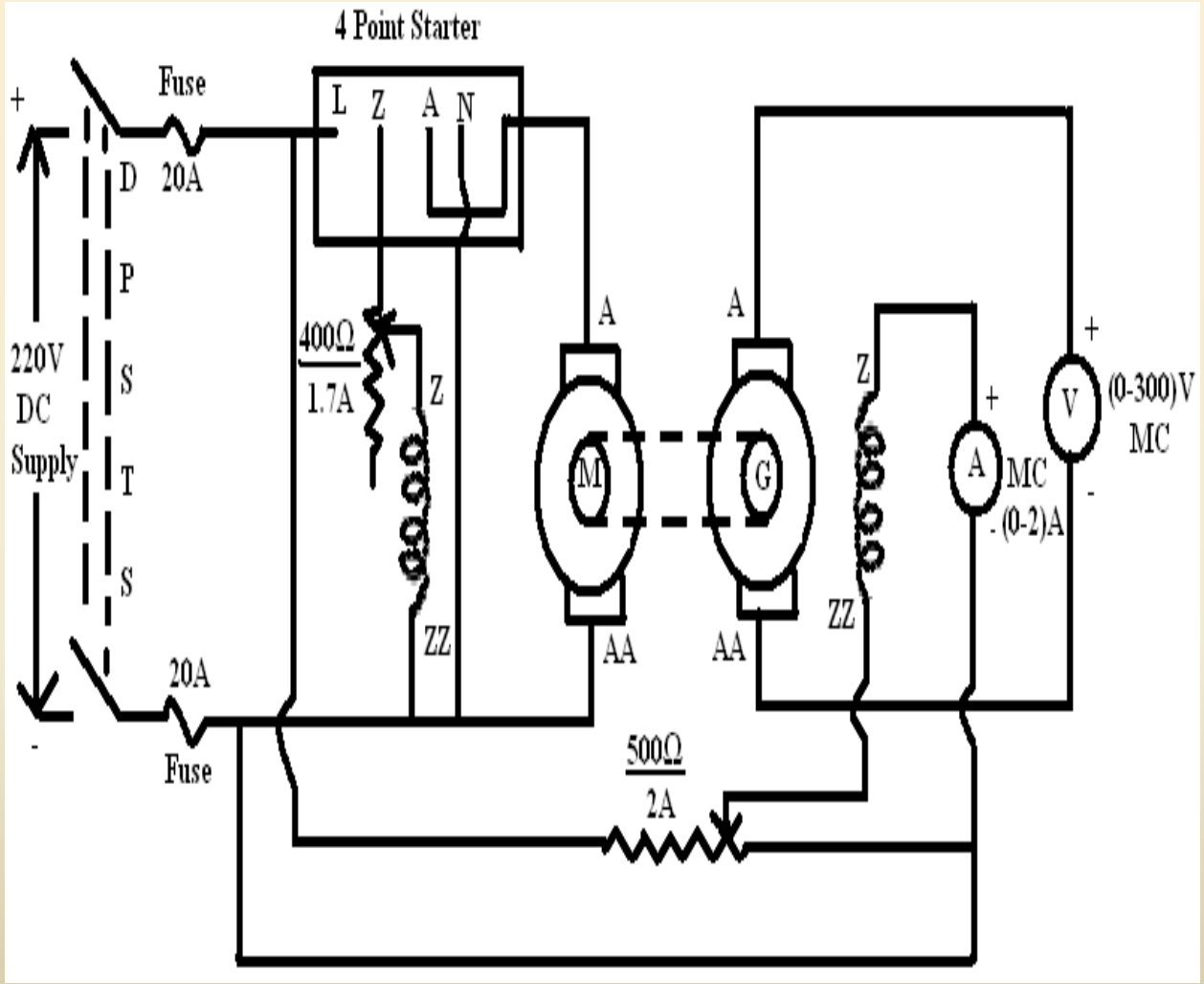
When Both sources are acting

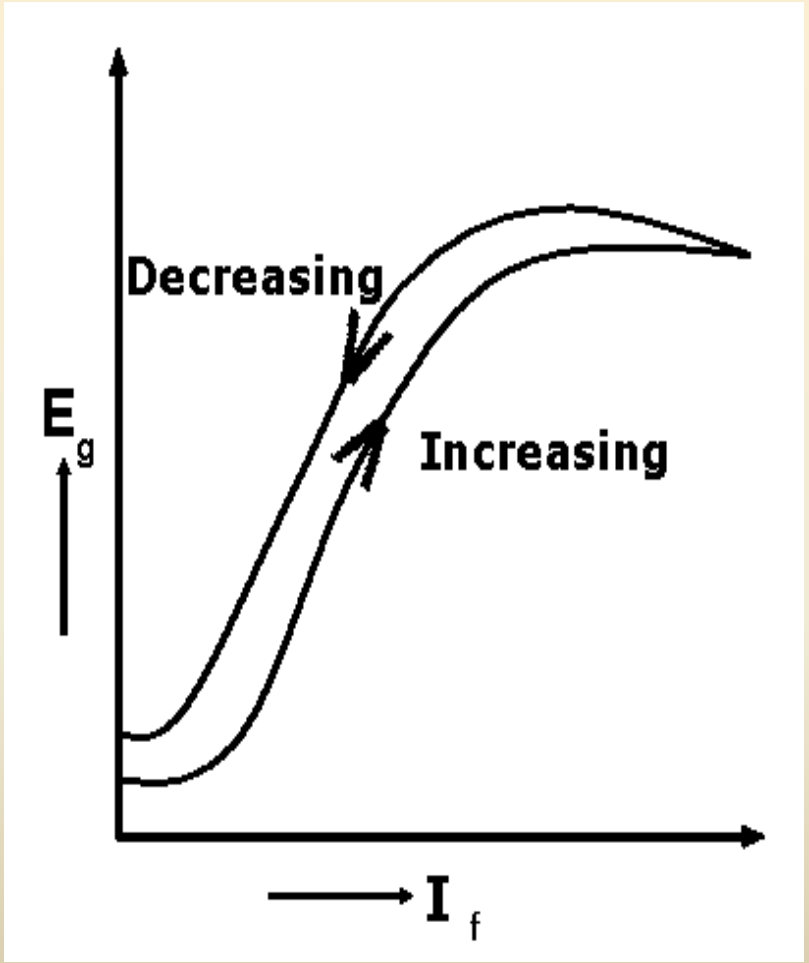


When One source is acting alone only



OPEN CIRCUIT CHARACTERISTICS OF A D.C GENERATOR





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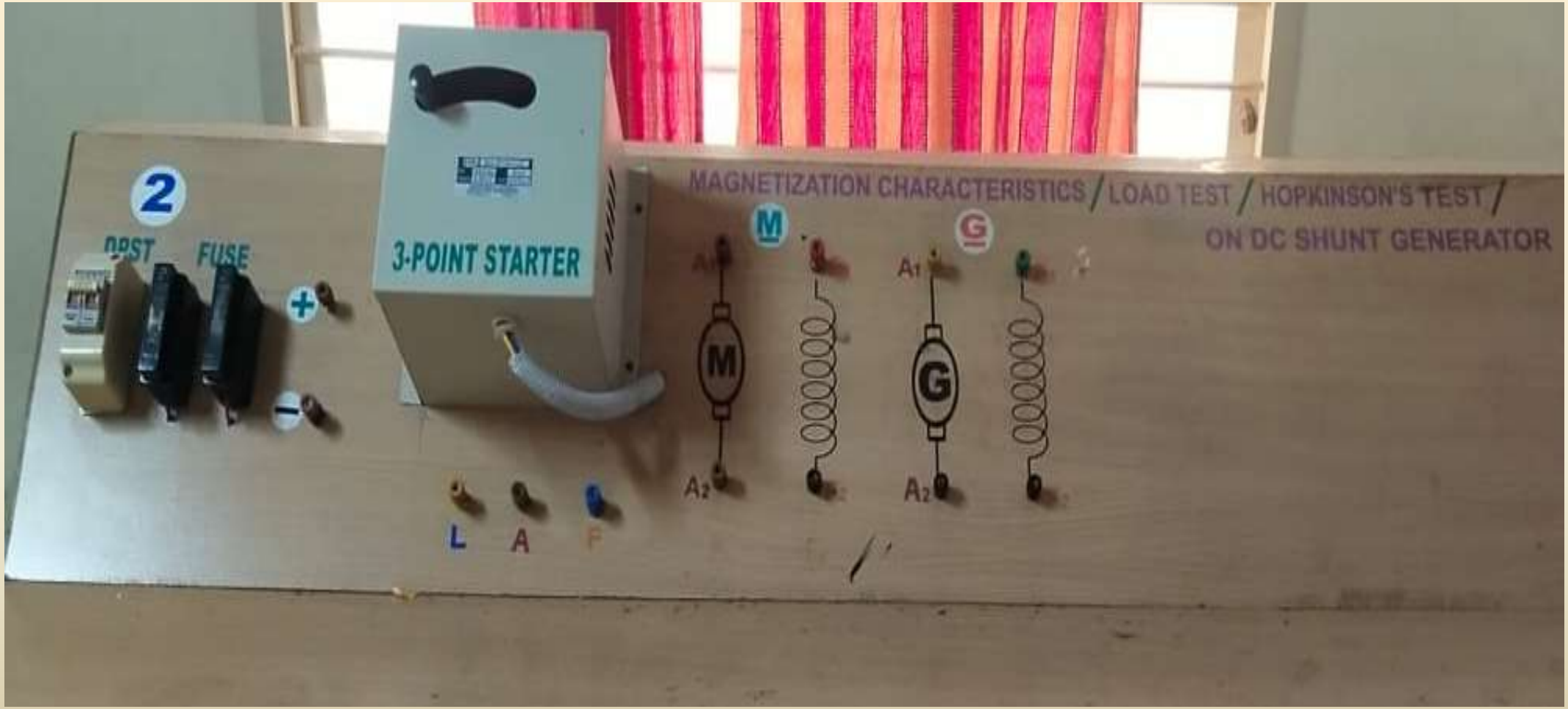
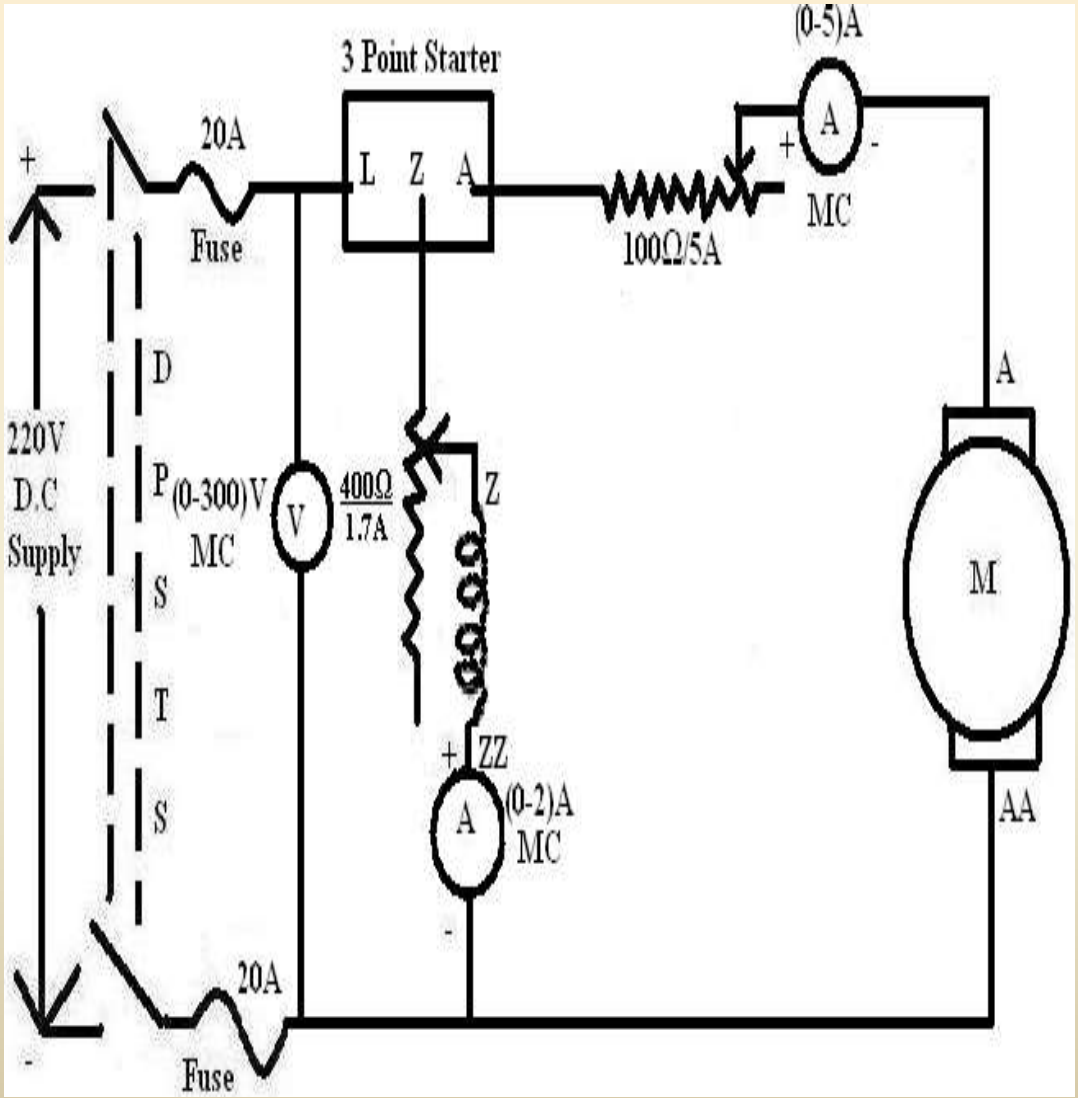
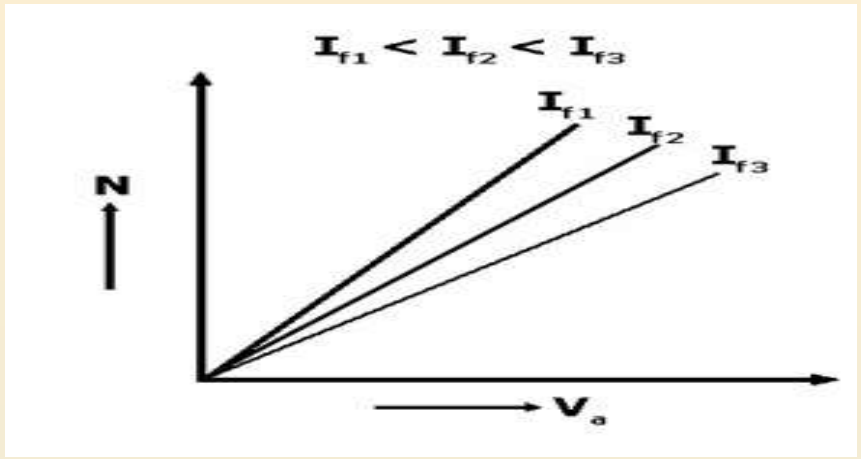
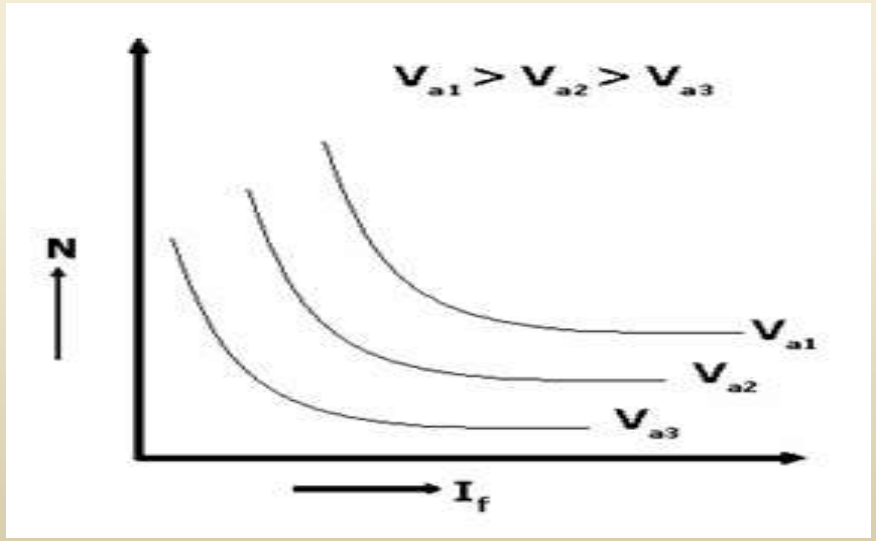


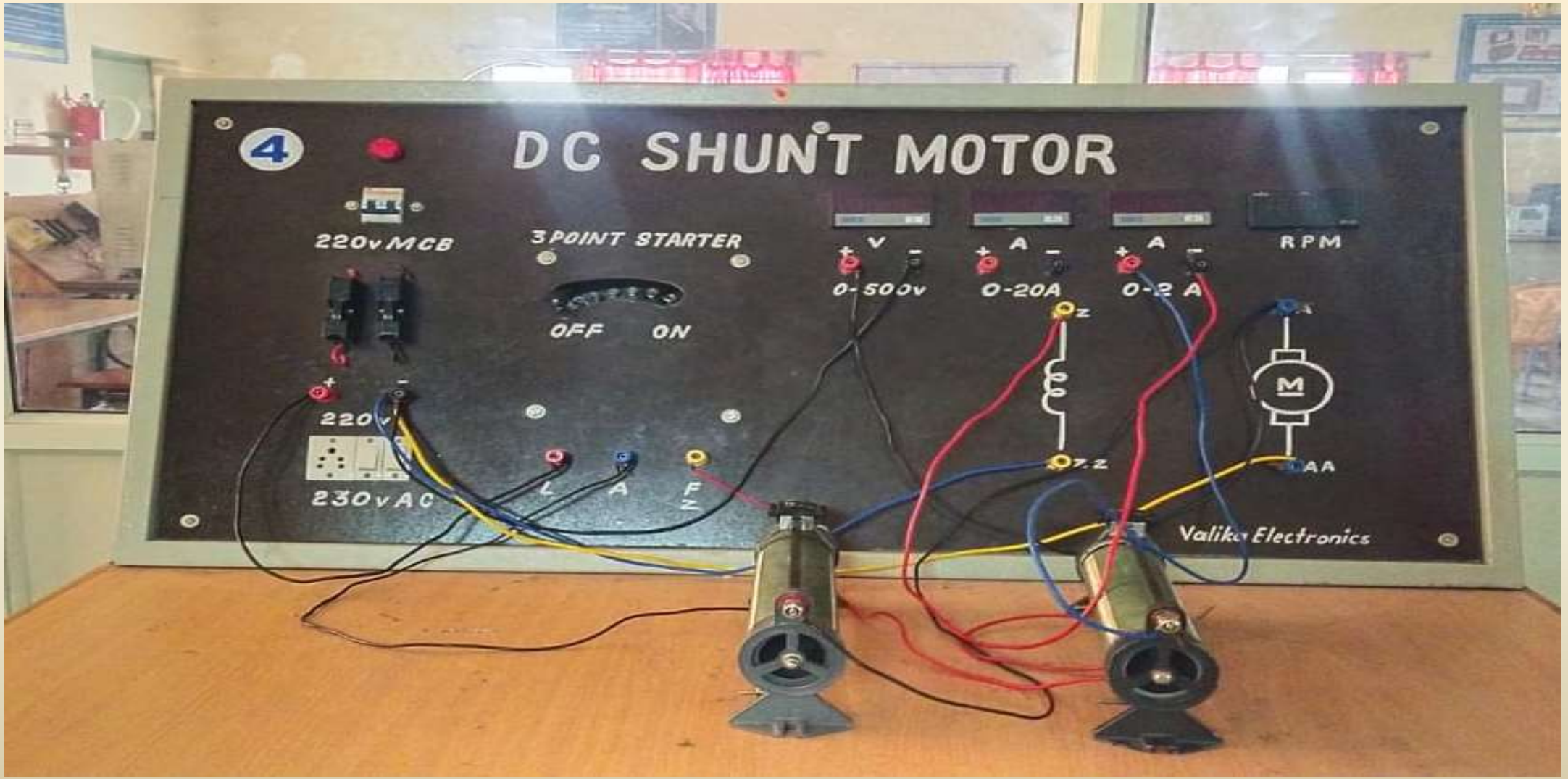
SPEED CONTROL OF A D.C SHUNT MOTOR



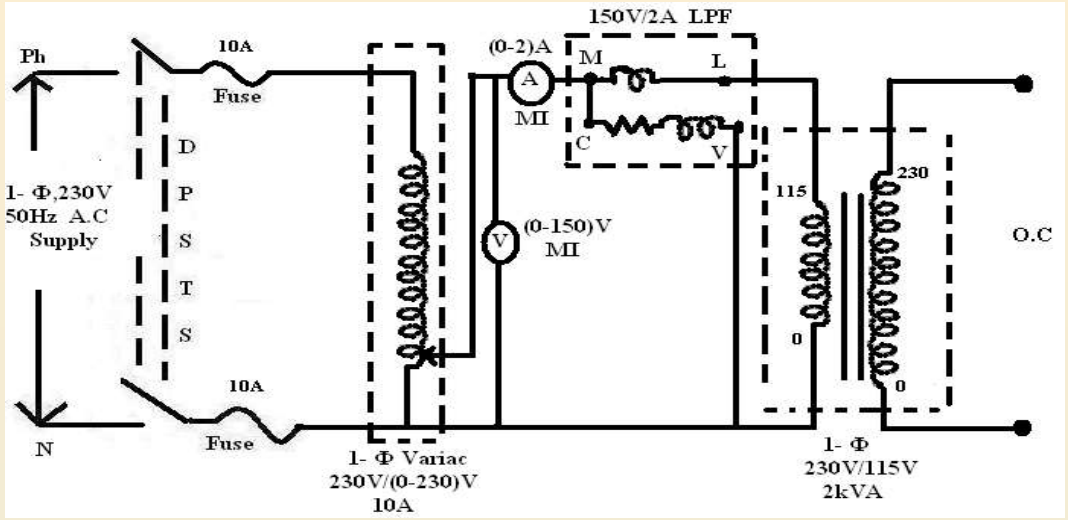




SPEED CONTROL OF A D.C SHUNT MOTOR

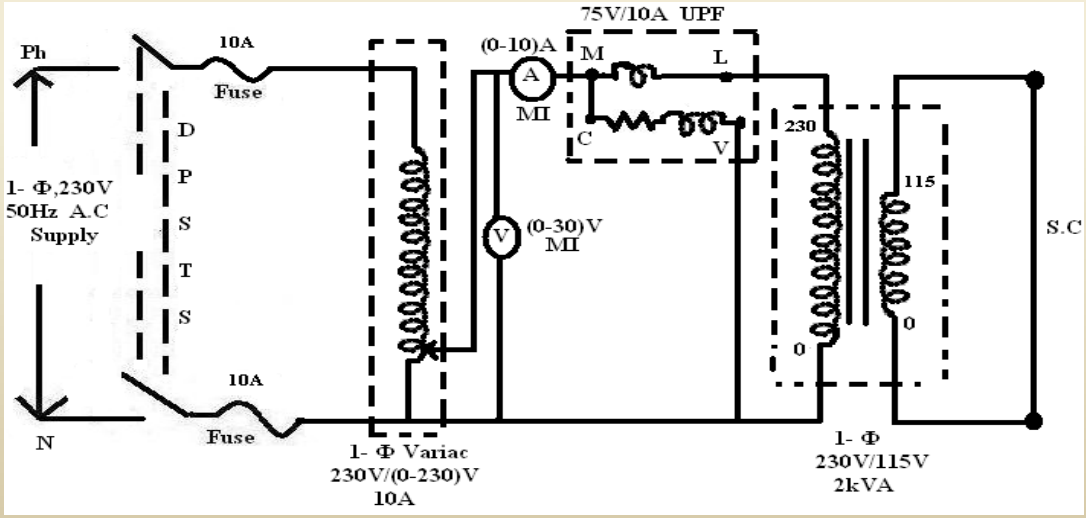


O.C & S.C TESTS ON 1-Ø TRANSFORMER



O.C Test:

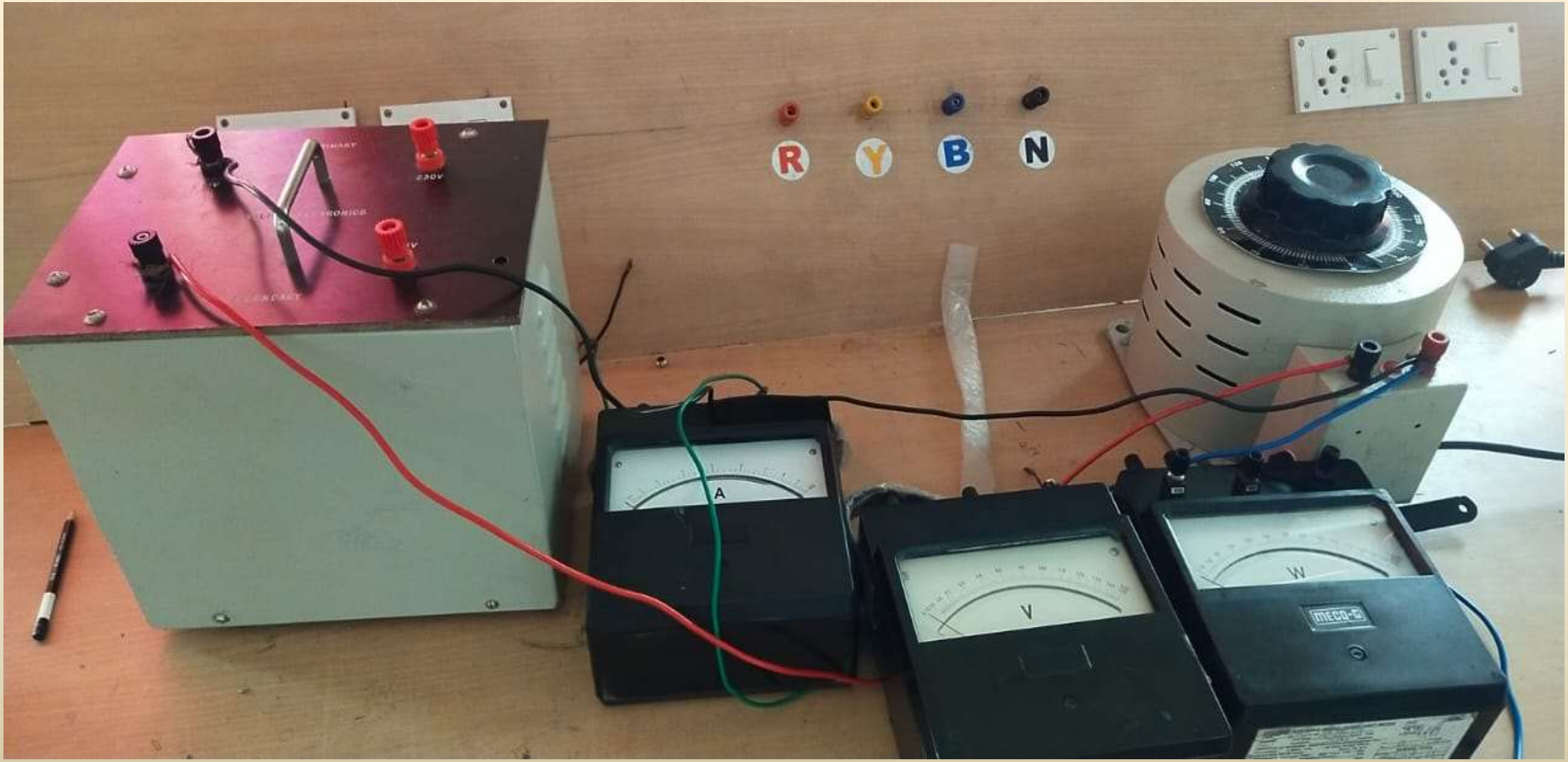
V_o (V)	I_o (A)	W_o = W X M.F (W)



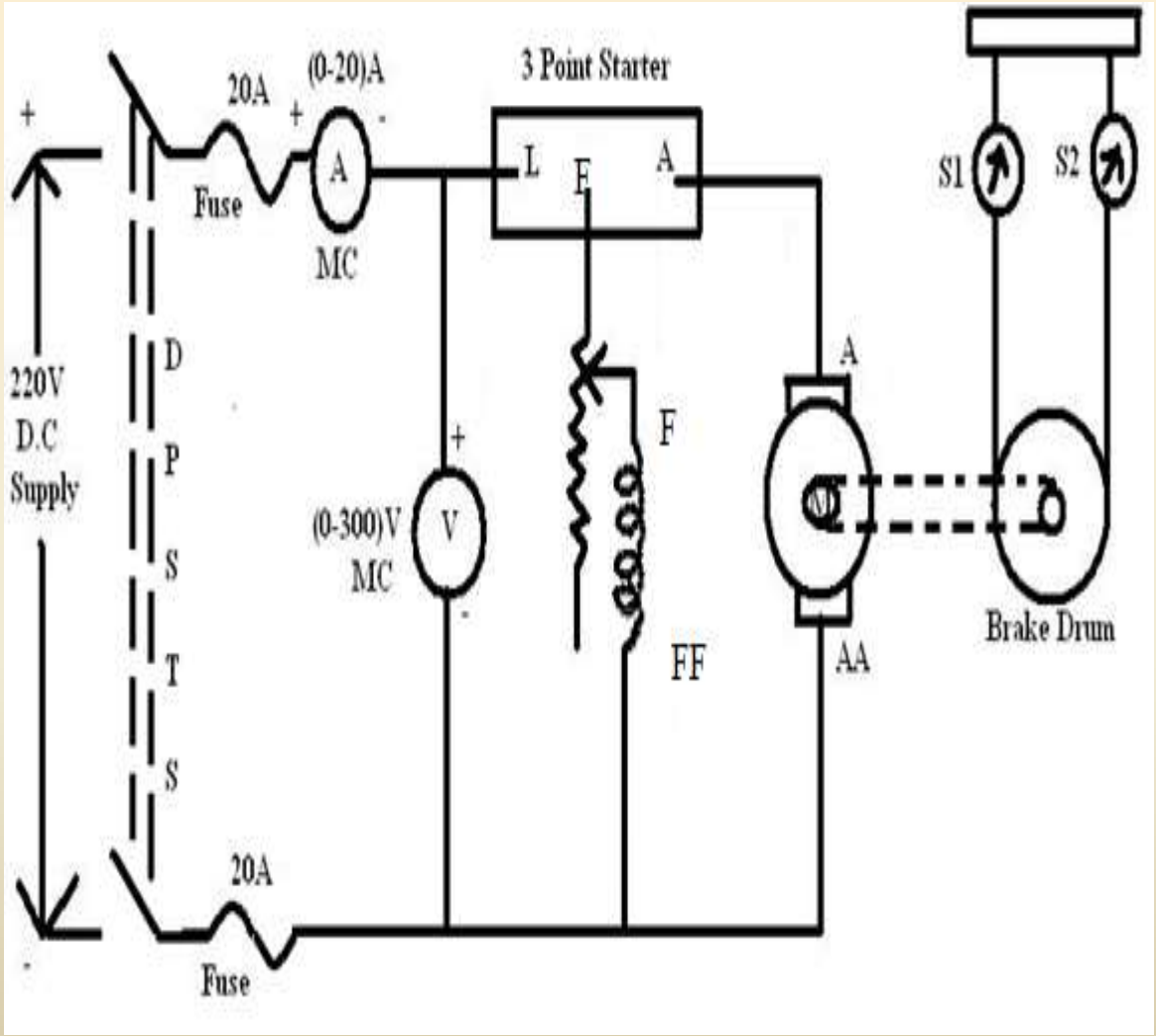
S.C Test:

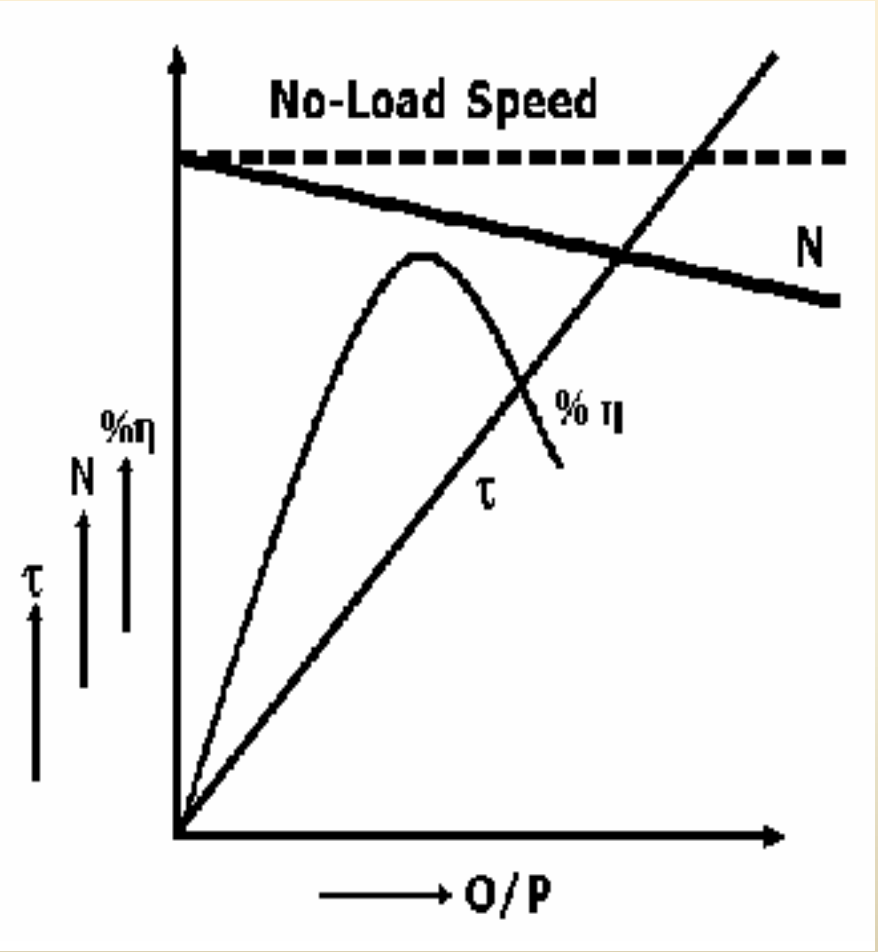
V_{SC} (V)	I_{SC} (A)	W_{SC} = W X M.F (W)

O.C & S.C TESTS ON 1-Ø TRANSFORMER

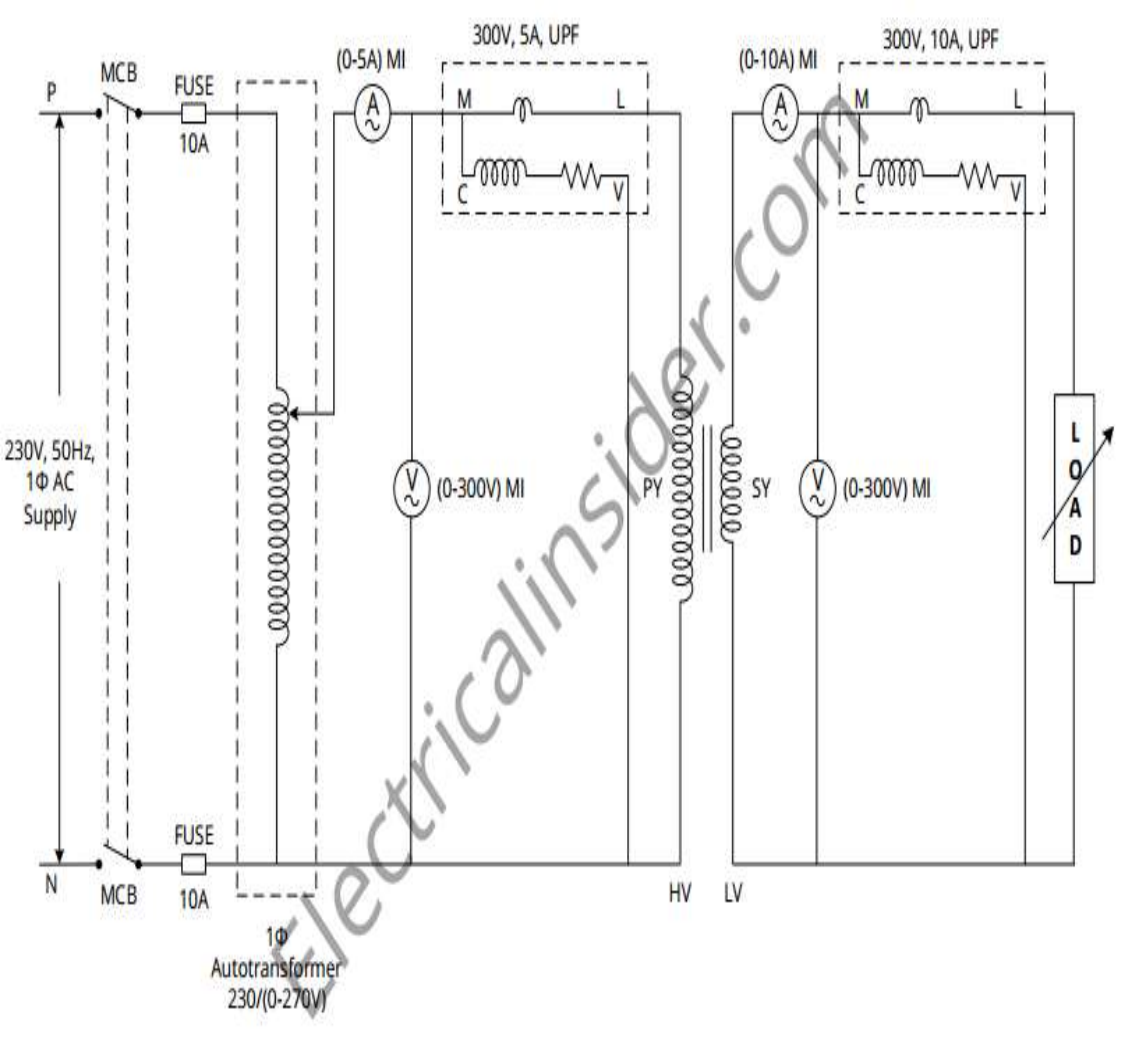


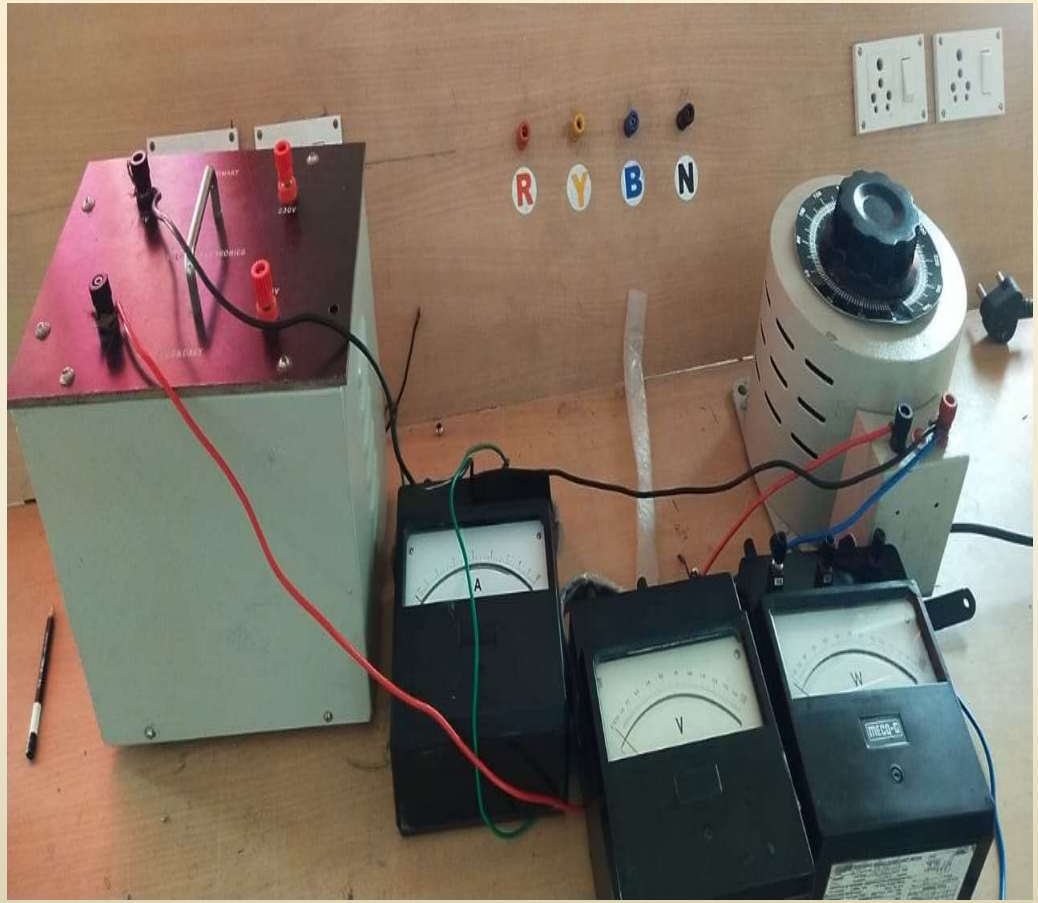
BRAKE TEST ON DC MOTOR



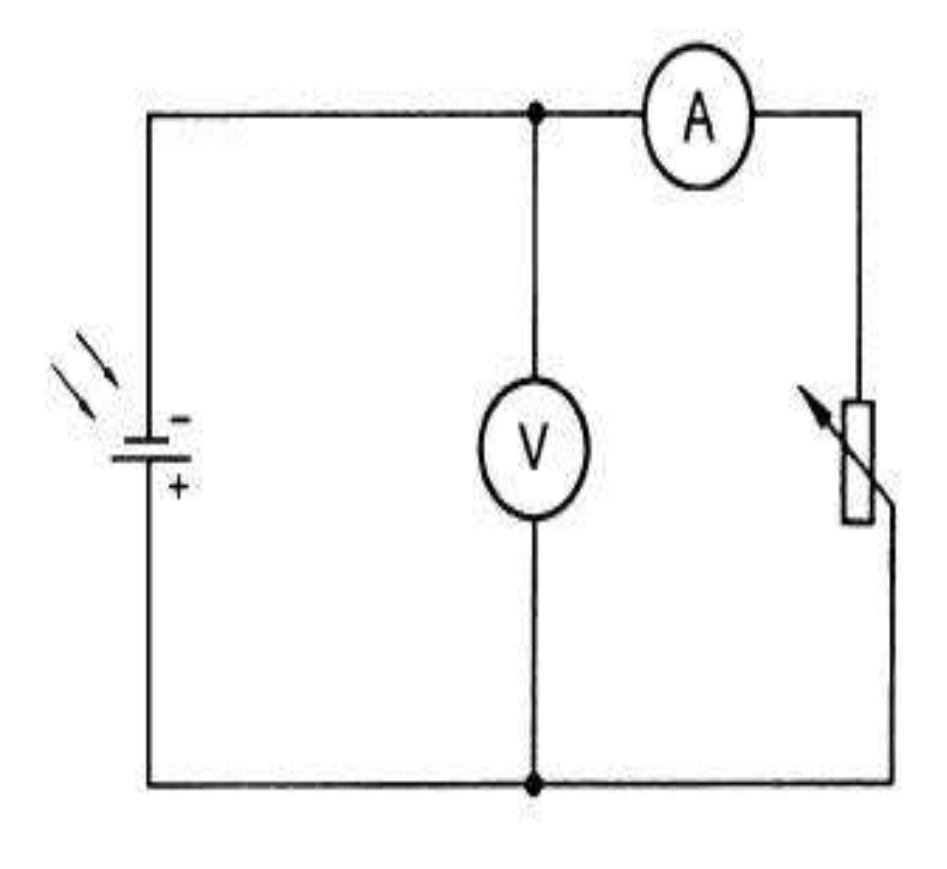


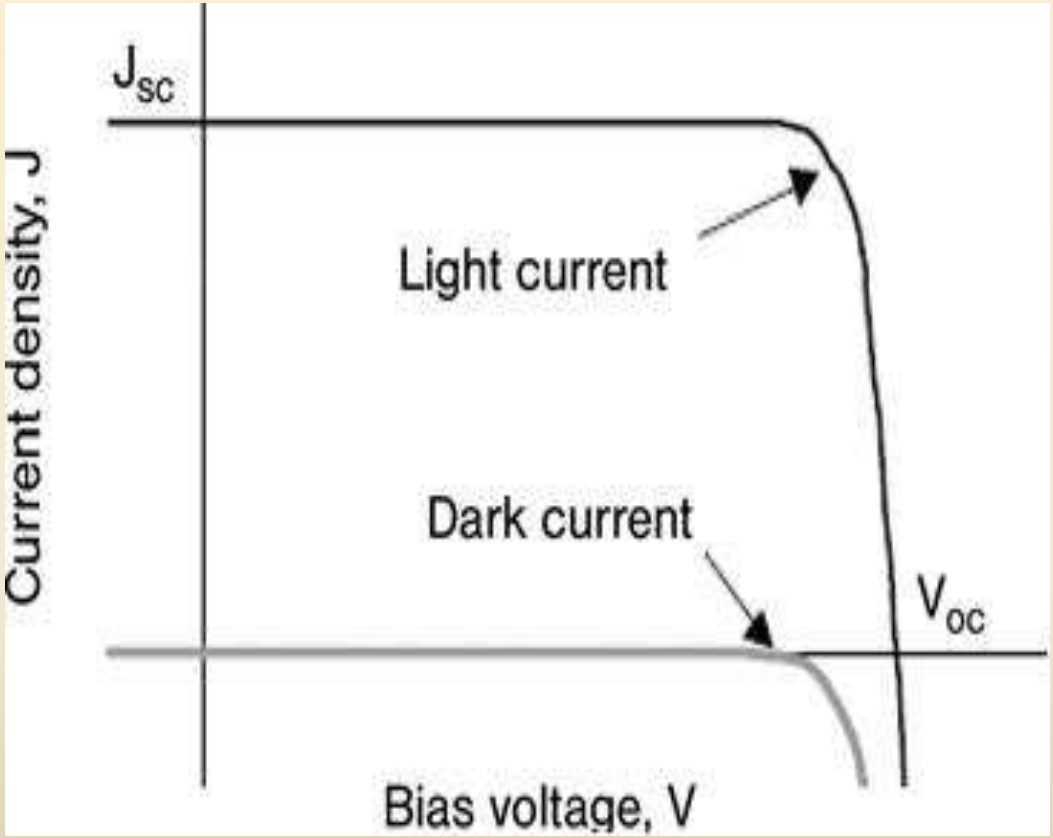
LOAD TEST ON 1-Ø TRANSFORMER





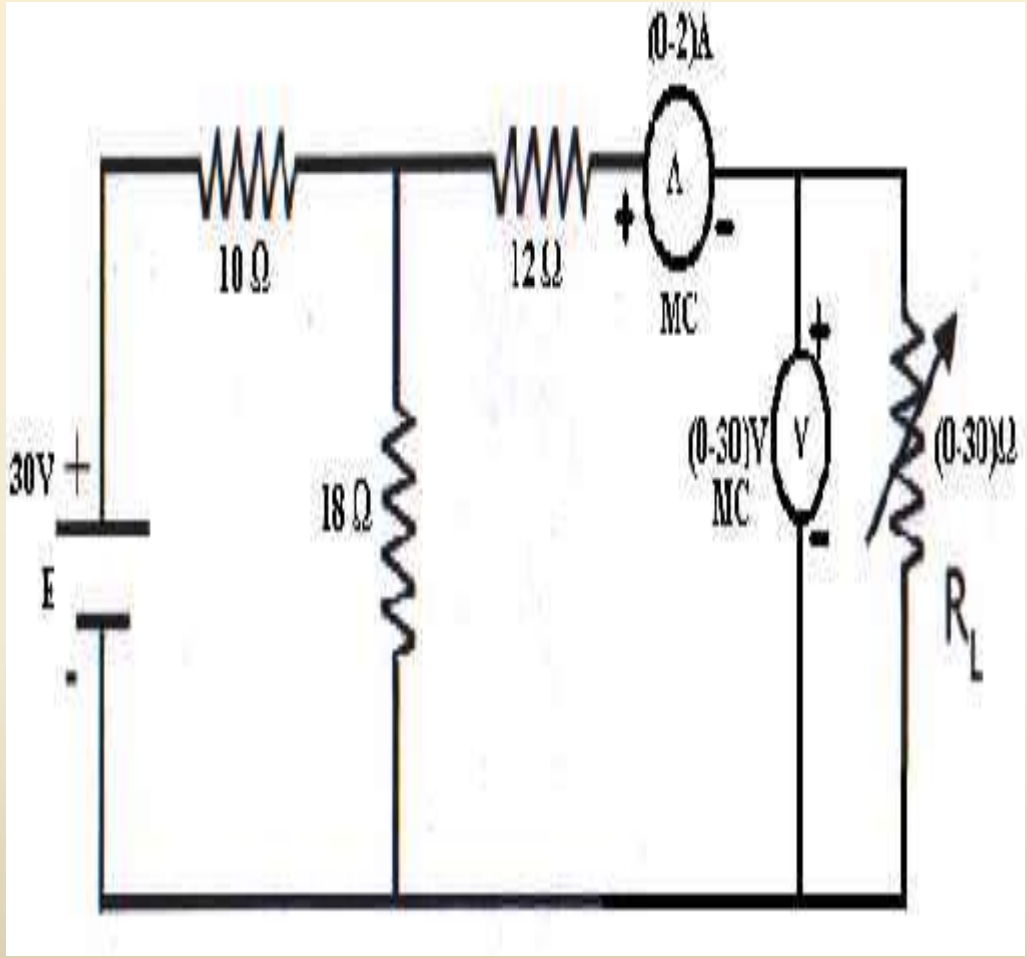
I-V CHARACTERISTICS OF SOLAR PV CELL

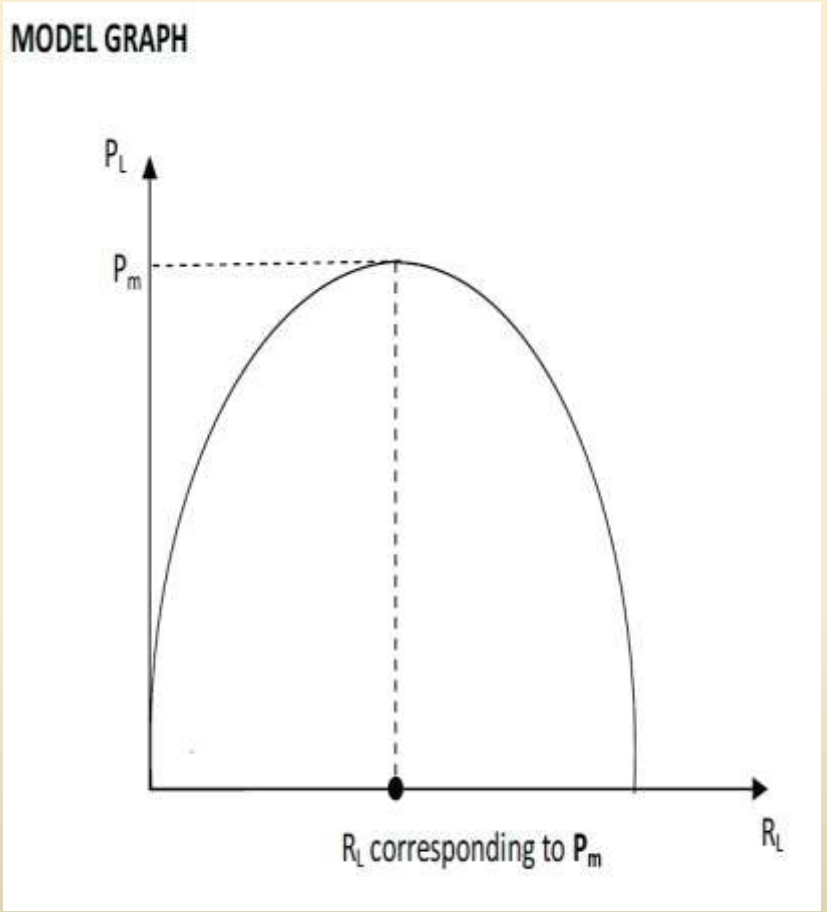




BRAKE TEST ON DC MOTOR

MAXIMUM POWER TRANSFER THEOREM





ANALYSIS OF RL & RC CIRCUITS FOR PULSE EXCITATION