

MODULE DESCRIPTOR VERSION: VE2		
No.	Course Learning Outcomes	Assessments
1	Interpret the working principles and performance characteristics of DC machines. (C3, PLO2)	Class Test
2	Analyse the concepts of AC circuits, and the working principles and performance characteristics of AC machines. (C4, PLO2)	Final Exam
3	Investigate DC Motors and Transformers characteristics. (C4, PLO4)	Individual Assignment

No.	AGMT TASK NO.	Question vs. Taxonomy																	
		Cognitive Level						Psychomotor Level							Affective Level				
		1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	3	4	5
CLO3	1				50M														
	2				50M														
	POM				100%														

Objectives:

The objectives of this assignment are to investigate the followings:

1. Characteristics of DC Shunt Motors based on armature, voltage and field control.
2. Characteristics Transformers based on open-circuit and short-circuit tests.

Problem statement 1:

Typically, DC motors are deployed in equipment that requires some form of rotary or motion-producing control. DC motors are essential components in many electrical engineering applications. Having a good understanding of DC motor operation and motor speed regulation enables engineers to design applications that achieve more efficient motion control.

Question 1:

Investigate the speed characteristics of DC Shunt Motor based on armature, voltage and field controls using MATLAB/Simulink. The modeling blocks should consist of the followings:

- DC Machine
- DC Voltage Source
- Series RLC Branch
- Bus Selector
- Voltage Measurement
- Current Measurement
- Gain
- Display
- Scope

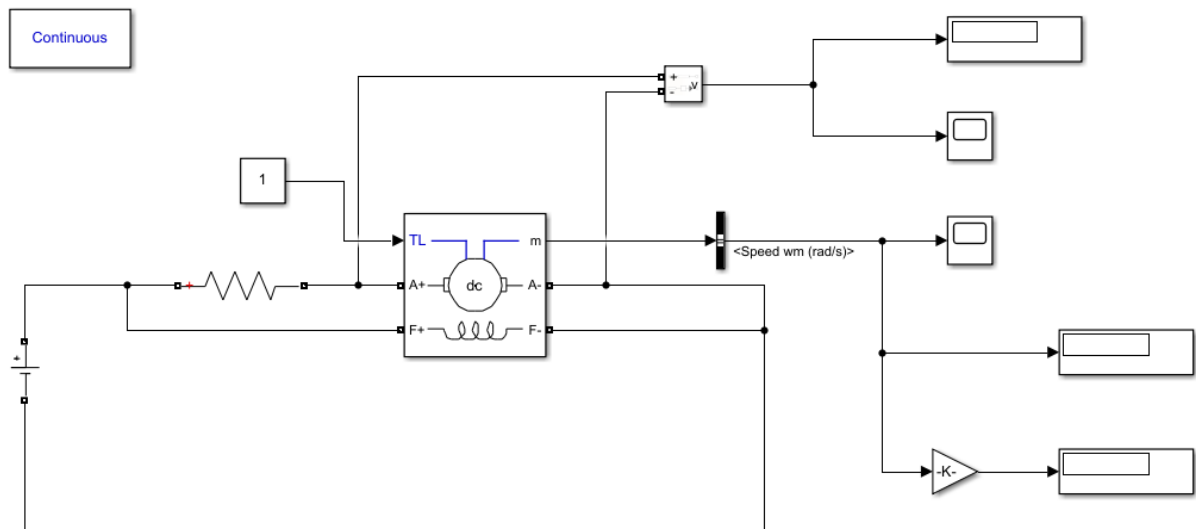


Fig. 1.1. Armature and voltage control of DC shunt motor

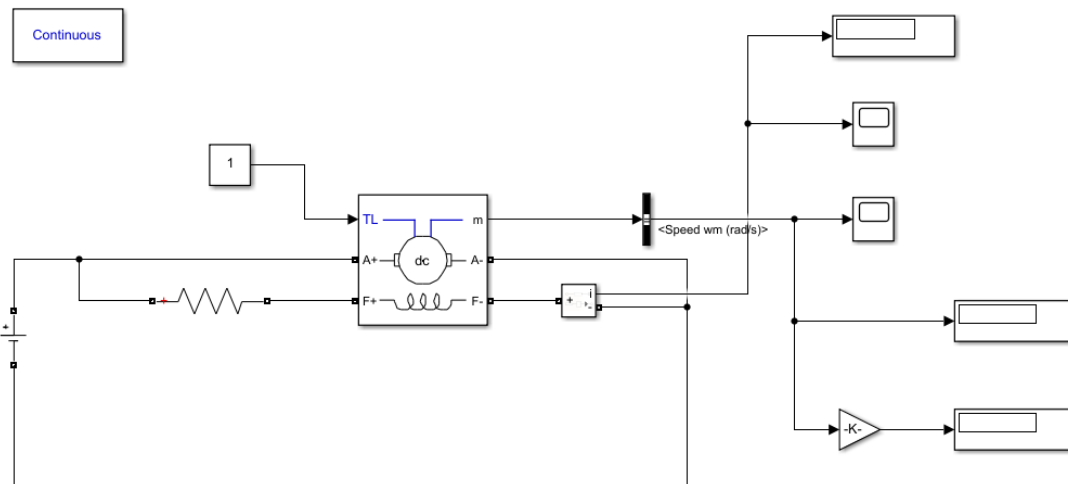


Fig. 1.2. Field control of DC shunt motor

Identify minimum five (5) input and output values for each of the speed control simulation as the followings:

- Resistance, armature current and speed
- Resistance, field current and speed
- Resistance, voltage and speed

Problem statement 2:

It is necessary to identify the impedance of the transformer in order to calculate its voltage regulation and efficiency. The impedance and other circuit parameters can be determined by conducting both open-circuit and short-circuit tests.

Question 2:

Investigate the performance of a single-phase transformer based on the circuit parameters obtained by the open-circuit and short-circuit tests using MATLAB/Simulink. The modeling blocks should consist of the followings:

- | | |
|-----------------------|-----------------------|
| • Powergui | • Current Measurement |
| • Linear transformer | • Power |
| • AC Voltage Source | • RMS |
| • Voltage Measurement | • Display |

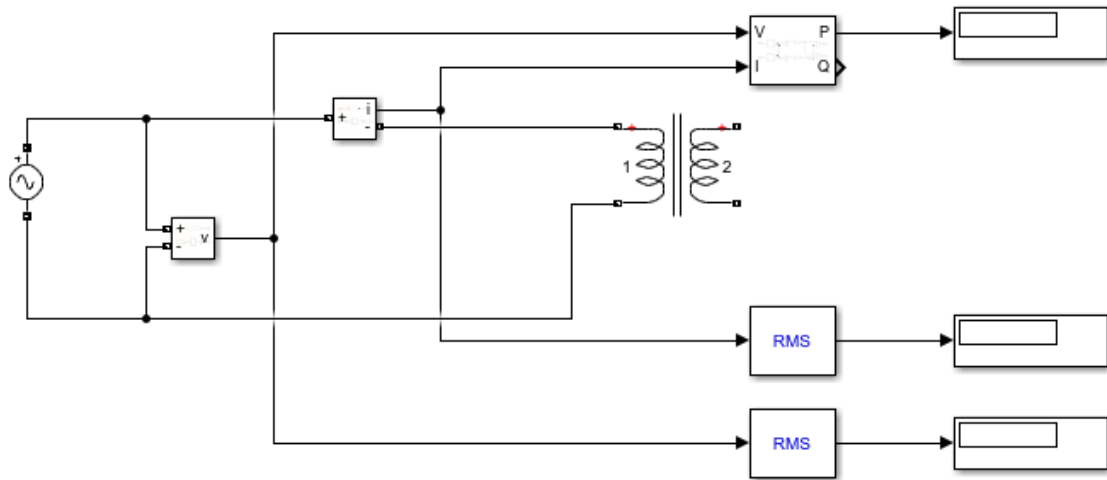


Fig. 2.1. Open-circuit test for single-phase transformer

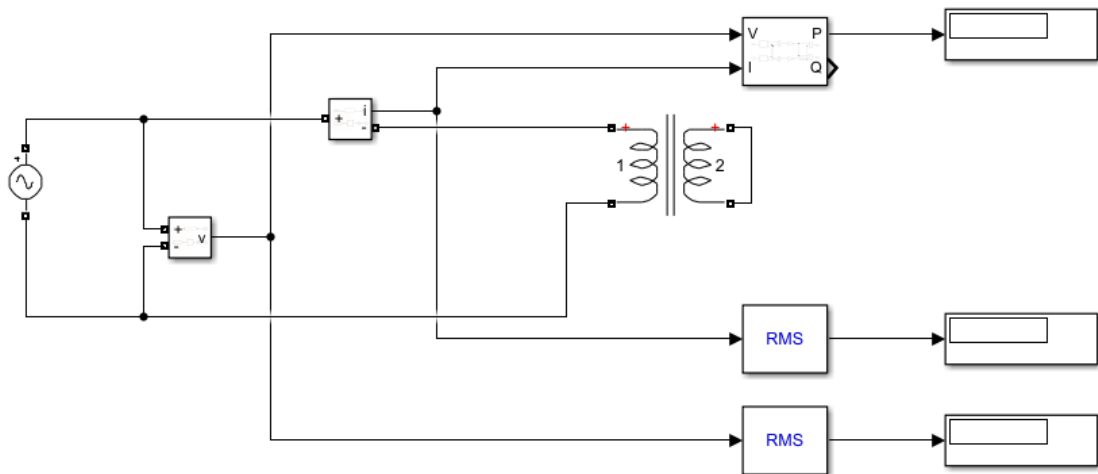


Fig. 2.2. Short-circuit test for single-phase transformer

Identify the input and output values of the simulation and **calculate** the circuit parameters of the transformer as the followings:

- Properties setting of the transformer
- Power, current and voltage output
- Iron and copper losses of the transformer
- Total equivalent resistance, reactance and impedance of both core and winding of the transformer
- Efficiency of the transformer

(Refer to Appendices A & B as guidelines in your report writing and assignment execution)

Assessment Criteria (100%):

- | | |
|---|------------|
| 1. Outline the simulation of speed control using MATLAB/Simulink. | 20% |
| 2. Plot the measured quantities with the aid of appropriate techniques. | 10% |
| 3. Analyse the speed characteristics of DC Shunt Motor. | 20% |
| 4. Outline the simulation of open-circuit and short-circuit tests using MATLAB/Simulink. | 20% |
| 5. Calculate the circuit parameters of the single-phase transformer. | 20% |
| 6. Analyse the characteristics of the single-phase transformer. | 10% |

APPENDIX A: General Requirement of Report

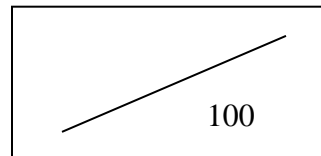
- The report must be formatted with a font size of 12pt if Times New Roman or a font size of 11pt if Arial and 1.5 line spacing. Please ensure the paragraphs are properly aligned/ justified.
- There should be List of Tables and List of Figures after the Table of Content.
- The report should be in chapters and the structure should not go beyond the second level. Instead of adding subsections at the third level you may use bullets if required.
- All information provided must be straight to the point, precise and all information must be accordingly cited and well presented. Avoid plagiarism.
- All figures and tables must have a title and referenced i.e. indicate the source.
- There might be slight variations in the order and content required, please do approach your relevant lecturer for future assistance.
- The report must be in binding.
- Please also include the following in you report
 - ✓ Page numbering at each page (Page X of Y)
 - ✓ Figure and table caption font size : Times New Roman,10 pt
 - ✓ Position of figure and table: Centre aligned.
- Citation and referencing should be done in accordance with the APA Referencing Method.
- The report should not exceed 30 pages of main text body (excluding title page, table of contents, list of tables and figures, list of abbreviations, list of references and appendices, if any).

APPENDIX B: Grading Criteria

Criteria	Fail 0 - 7	Marginal Fail 8 - 9	Pass 10 - 12	Credit 13 - 15	Distinction 16 - 20
Outline the simulation of speed control using MATLAB/Simulink (20%) [CLO3-PLO4- C4]	<ul style="list-style-type: none"> Outlined simulation does not address assignment objectives; no model block included; no results included. 	<ul style="list-style-type: none"> Outlined simulation does not address assignment objectives; no model block included; minimal results included. 	<ul style="list-style-type: none"> Outlined simulation does not accurately address assignment objectives; appropriate model block included; average results included. 	<ul style="list-style-type: none"> Outlined simulation does not accurately address assignment objectives; appropriate model block included; good results included. 	<ul style="list-style-type: none"> Outlined simulation accurately addresses assignment objectives; appropriate model block included; excellent results included.
Plot the measured quantities with the aid of appropriate techniques. (10%) [CLO3-PLO4- C4]	0 - 2 <ul style="list-style-type: none"> Plotted no/minimal graphs with no units and labels provided. 	3 - 4 <ul style="list-style-type: none"> Plotted poor graphs with no units and labels provided. 	5 - 6 <ul style="list-style-type: none"> Plotted average graphs with units and labels provided. 	7 - 8 <ul style="list-style-type: none"> Plotted good graphs with units and labels provided. 	9 - 10 <ul style="list-style-type: none"> Plotted excellent graphs with units and labels provided.
Analyse the speed characteristics of DC Shunt Motor. (20%) [CLO3-PLO4- C4]	0 - 7 <ul style="list-style-type: none"> Analysed with poor analysis the simulation results; no theory discussed; no conclusion included. 	8 - 9 <ul style="list-style-type: none"> Analysed with weak analysis on the simulation results; poor theory discussed; poor conclusion included. 	10 - 12 <ul style="list-style-type: none"> Analysed with average analysis on the simulation results; average theory discussed; average conclusion included. 	13 - 15 <ul style="list-style-type: none"> Analysed with good analysis on the simulation results; good theory discussed; good conclusion included. 	16 - 20 <ul style="list-style-type: none"> Analysed with excellent analysis on the simulation results; excellent theory discussed; excellent conclusion included.
Outline the simulation of open-circuit and short-circuit tests using MATLAB/Simulink. (20%) [CLO3-PLO4- C4]	0 - 7 <ul style="list-style-type: none"> Outlined simulation does not address assignment objectives; no model block included; no results included. 	8 - 9 <ul style="list-style-type: none"> Outlined simulation does not address assignment objectives; no model block included; minimal results included. 	10 - 12 <ul style="list-style-type: none"> Outlined simulation does not accurately address assignment objectives; appropriate model block included; average results included. 	13 - 15 <ul style="list-style-type: none"> Outlined simulation does not accurately address assignment objectives; appropriate model block included; good results included. 	16 - 20 <ul style="list-style-type: none"> Outlined simulation accurately addresses assignment objectives; appropriate model block included; excellent results included.

Calculate the circuit parameters of the single-phase transformer. (20%) [CLO3-PLO4- C4]	0 - 7	8 - 9	10 - 12	13 - 15	16 - 20
	<ul style="list-style-type: none"> Calculated with poor calculation, not able to identify the assumptions made and detailed steps not taken. 	<ul style="list-style-type: none"> Calculated with weak calculation, able to identify only one assumption made and detailed steps not taken. 	<ul style="list-style-type: none"> Calculated with average calculation, able to identify the assumptions made and steps are not taken accurately. 	<ul style="list-style-type: none"> Calculated with good calculation, able to identify the assumptions made, some steps omitted but steps are taken accurately. 	<ul style="list-style-type: none"> Calculated with extensive and detailed calculation, able to identify and to explain the assumptions made. All steps are taken accurately.
Analyse the characteristics of the single-phase transformer. (10%) [CLO3-PLO4- C4]	0 - 2	3 - 4	5 - 6	7 - 8	9 - 10
	<ul style="list-style-type: none"> Analysed with poor analysis the simulation results; no theory discussed; no conclusion included. 	<ul style="list-style-type: none"> Analysed with weak analysis on the simulation results; poor theory discussed; poor conclusion included. 	<ul style="list-style-type: none"> Analysed with average analysis on the simulation results; average theory discussed; average conclusion included. 	<ul style="list-style-type: none"> Analysed with good analysis on the simulation results; good theory discussed; good conclusion included. 	<ul style="list-style-type: none"> Analysed with excellent analysis on the simulation results; excellent theory discussed; excellent conclusion included.

Total Marks:



 Lecturer: Hazwani Mohd Rosli