VEE 266

College of Micronesia – FSM P.O. Box 159 Kolonia, Pohnpei

Course Outline Cover Page

Rotating Machinery Course Title **VEE 266**

Department and Number

<u>Course Description</u>: This course introduces the student to rotating machinery. Series, shunt and compound DC motors, AC motors and generators, stepper motors and three-phase power are analyzed.

Prepared by: Grilly Jack		State: Pohnpei Campus		
Lecture	Hours per Week 3/8	No. Of Weeks 16/8	Total Hours 48	Semester Credits 3
Laboratory	Total S		ester Credits:	3
Purpose of Course Degra Degra Adva Certi Rema Other		ree Requirement ree Elective anced Certificate ificate nedial er (Workshop)	XX	
Prerequisite	e Course(s): Admission	on and VEM 104		

Signature, Chairman, Curriculum Committee

Date Approved by Committee

Signature, President, COM-FSM

Date Approved by the President

General Objective:

This course will introduce the students to the basic fundamentals of DC Motors and Generators. The students will be able to define, identify and categorize the devices that make up rotating machinery. The students will also learn the different characteristics of rotating machinery.

Learning Outcomes:

Upon successful completion of this course the student will be able to:

- 1. Describe the various devices that are called rotating machinery.
- 2. Describe the operation of DC Motors and Generators
- 3. Describe the characteristics of DC Motors and Generators.
- 4. Describe the Stepper Motor.
- 5. Describe the characteristics of a Stepper Motor.
- 6. Describe the Stepper Motor driver
- 7. Observe the operation of the stepper motor
- 8. Trouble shoots the stepper motor.

STUDENTS SHOULD BE MADE AWARE OF OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ALL SITUATIONS AND BE EXPECTED TO DEMONSTRATE SAFE WORKING PRACTICES AT ALL TIMES.

Outline of Content:

This course contains:

- 1. Rotating machinery
 - Motors
 - Incremental motors
 - Continuous motors
 - Generators
 - DC generators
 - AC generators
- 2. DC motors and Generators
 - Magnetism
 - Principals of Magnetism
 - Magnetic fields
 - Magnetic poles
 - Electrical current
- 3. Characteristics
 - Attractions and repulsion
 - Motor action
 - Electromagnet
 - Commutator Action
 - Schematic symbols

- Single loop
- Double loop
- Speed
- Torque
- CEMF
- Power
- Efficiency
- 4. Stepper motor
 - Operation
 - One phase pattern
 - Two phase pattern
 - Schematic
- 5. Characteristics
 - RPM
 - SR
 - EFSS
- 6. Motor Driver
 - Driver Circuit
 - Stepper Sequence
 - Stepper motor, Unipolar
 - Stepper Sequence, Bipolar
 - One phase control circuit
 - Two phase control circuit
- 7. Observe the operation of the stepper motor.
 - CW and CCW direction
 - Step and Run mode
 - Free Start Run Rate
- 8. Troubleshoot the stepper motor.
 - Calculate the RPM.
 - Measure signals.
 - Locate failed Components.

Learning Outcomes:	On completion of this course the learner will be able to:		
Learning Outcome 1	Describe the various devices that are called rotating machinery.		
Assessment Criteria	a. b.	Describe a basic motor. Describe a incremental motor	

c. Describe a continuous motor

Assessment Method	 d. Describe a generator e. Describe a DC generator f. Describe an AC generator Multiple choice questions Short answer questions
Learning Outcome 2	Describe the operation of a DC motor and generator.
Assessment Criteria	 a. Describe magnetism b. Describe the principals of magnetism c. Describe magnetic fields. d. Describe magnetic poles. e. Describe the relationship of current and magnetic field.
Assessment Method	Multiple choice questions Short answer questions

Learning Outcome 3 Describe the characteristics of DC motor and generators.

- Assessment Criteria a.
- a. Describe the attraction and the repulsion of a motor.
 - b. Describe the motor action.
 - c. Describe electromagnet
 - d. Describe commutator action
 - e. Describe the schematic symbols for motors
 - f. Describe single loop of generator output.
 - g. Describe double loop of generator output
 - h. Describe the speed, torque, CEMF, power and efficiency of a motor.
- Assessment MethodMultiple choice questions
Short answer questionsLearning Outcome 4Describe the Stepper motor.
 - a. Describe the operation of a stepper motor.
 - b. Describe the one phase pattern of a stepper motor.
 - c. Describe the two phase stepper motor
 - d. Describe the schematic of the stepper motor.

Assessment Method Multiple choice questions

Assessment Criteria

	Short answer questions Experiments
Learning Outcome 5	Describe the characteristics of a stepper motor.
Assessment Criteria	 a. Describe the rule involved in the revolution of a stepper motor b.Describe the slew rate of the stepper motor. a. Describe the error free stert step rate of a stepper motor.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 6	Describe the stepper motor driver.
Assessment Criteria	 a. Describe the driver circuit of a stepper motor. b. Describe the stepper motor sequence. c. Describe stepper motor sequence, unipolar. d. Describe the stepper motor sequence, bipolar. e. Describe the stepper motor one phase control circuit. f. Describe the stepper motor two-phase control circuit.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 7	Observe the operation of the Stepper Motor.
Assessment Criteria	a. Observe the stepper motor in CW and CCW directionsb. Observe the Step and Run mode.g. Observe the free start – run rate.
Assessment Method	Multiple choice questions Short answer questions Practical exercises/tests
Learning Outcome 8	Troubleshoot the Stepper Motor.
Assessment Criteria	a. Calculate the RPM of the Motor.b. Measure the signals of the Stepper Motor.h. Locate the failed components on the Stepper Motor.

Assessment Method	Multiple choice questions
	Short answer questions
	Practical exercises/tests

Required Course Materials:

- 1. Instructor:
 - a. CAI Classroom with whiteboard or chalkboard
 - b. Laboratory equipment with tools of the trade
 - c. Text, Teacher's Resource Guide, workbook
 - d. Overhead projector, transparencies

2. Student:

- a. Text(s), handouts provided by instructor
- b. Ring binder
- c. College ruled note sheet, pencil or pen
- d. Scientific calculator

Reference Materials:

Principles of Electric Circuits, *Sixth Edition* Thomas L. Floyd.

Method of Instruction:

- 1. Computer Aided Instruction
- 2. Practical/Experimentation

Evaluation:

Final Grade for this course will be based on meeting the course requirements at the following percentage rates:

96% - 100%	A – Superior
90% - 95%	B – Above Average
80% - 89%	C – Average
69% - 79%	D – Below Average
0 % - 69%	F – Failure

Attendance:

The COM-FSM vocational educational attendance policy will apply.