

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

Course Outline Cover Page

Rotating Machinery
Course Title

VEE 266
Department and Number

Course Description: This course introduces the student to rotating machinery. Series shunt and compound DC motors and generators, steppers and three-phase power are analyzed.

Prepared by: Grilly Jack

State: Pohnpei Campus

	Hours per week	No. of Week	Total Hours	Semester Credits
Lecture	3/8	16/8	48	3
Laboratory				
Total Semester Credits:				3

Purpose of Course

Degree Requirement XX
Degree Elective
Advanced Certificate
Certificate
Remedial
Other (Workshop)

Prerequisite Course(s): Admission and VEM 104

SPENSIN JAMES
Signature, Chairman, Curriculum Committee

9/19/03
Date Approved by Committee

Michael Tatum
Signature, President, COM-FSM

9/19/03
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 driver
7. Observe the operation of the stepper motor
8. Troubleshoots the stepper motor.

STUDENTS SHOULD BE MADE AWARE OF OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ALL SITUATIONS AND BE EXPECTED TO DEMONSTRATE 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
 - Principles of Magnetism
 - Magnetic fields
 - Magnetic poles
 - Electrical current
3. Characteristics

- Attractions and repulsion
 - Motor action
 - Electromagnet
 - Commutate 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. Describe a basic motor.
- b. Describe a incremental motor
- c. Describe a continuous motor
- d. Describe a generator
- e. Describe a DC generator
- f. Describe an AC generator

Assessment Method

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 principles 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. 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
- h. Describe the speed, torque, CEMF, power and efficiency of a motor.

Assessment Method

Multiple choice questions
Short answer questions

Learning Outcome 4

Describe the Stepper motor.

Assessment Criteria

- 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.

Short answer questions

Experiments

Learning Outcome 5

Describe the characteristics of a stepper motor.

Assessment Criteria
motor

- a. Describe the rule involved in the revolution of a stepper motor.
- b. Describe the slew rate of the stepper motor.
- c. Describe the error free start – stop 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 sequences, unipolar.
- d. Describe the stepper motor sequence,
- 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 directions
- b. Observe the Step and Run mode.
- c. 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.
- c. 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:

Principle 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.