GRANDE PRAIRIE REGIONAL COLLEGE
Industrial Training

Power Engineering Program

COURSE SYLLABUS - SEMESTER II

APPLIED MECHANICS II: PN 1010

A continuation of the topics in mathematics and physics discussed in Applied Mechanics I.
Prerequisites: PN 1000

Textbooks: *Technical Physics*, Erwin Sellick.
Fourth Class Power Engineering Course, S.A.I.T.
Electric Circuits and Machines, Eugene Lister.

Class Hours: See Timetable

Course Objectives

Unit 1: Applied Science: Logarithms

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

1. define the basic terms used in dealing with logarithms, including mantissa, characteristic, logarithm, antilogarithm.
2. determine the mantissa and the characteristic of a logarithm of a number.
3. use logarithms for evaluating expressions which involve multiplication, division; mixed with addition and subtraction.
4. use logarithms to evaluate expressions which involve finding the root of a number or raising a number to a required power.

Unit 2: Trigonometry

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

1. identify the various angles in a right angle triangle that can be calculated through the use of trigonometry.
2. measure angles in both degrees and radians, and their inter-relationship.

3. label and name the angles and sides of a right angle triangle, to write the trigonometric functions of the acute angles in terms of the ratios of the appropriate sides of the triangle, and to obtain values from trigonometrical tables for trigonometrical functions of acute angles.

4. solve right angle triangle problems including, finding unknown angles and sides of triangles, using trigonometry and the "theorem of pythagoras".

Unit 3: Mensuration

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

1. calculate the areas of triangles, quadrilaterals, circles, sectors of circles, segments of circles.

2. calculate surface area and volume of solids.

Unit 4: Applied Mechanics I

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

1. define and solve problems involving vectors and scalars.

2. define and solve problems involving mechanical friction.

3. define and solve problems involving work, energy, and power.

Unit 5: Applied Mechanics II

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

1. define and differentiate between speed, velocity, distance, displacement, mass, force and acceleration.

2. solve problems involving uniformly accelerated motion.

3. define and solve problems involving moments and forces in statics.

4. solve problems involving wheel and axles, screw jacks, and block and tackle systems.

5. understand the relationship between IMA, AMA, Efficiency, and VR for simple machines.

Unit 6: Applied Mechanics III

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

1. discuss terms used to describe the properties of materials.

2. calculate the bending moment of beams including uniformly distributed loads.

3. understand and define: density and relative density, pressure and vacuum.

Unit 7: Thermodynamics I

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

1. define temperature, heat, radiant heat, convection, conduction.
2. solve problems on the subject of expansion of liquids and solids due to the addition of heat.
3. solve problems on how the flow of heat can cause a change of state, and a thermal equilibrium on various substances.
4. solve problems of steam generation and condensation. Steam Table calculations, efficiency, superheat and dryness fractions.

Unit 8: Thermodynamics II

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

1. define and solve problems involving:
   (i) work, (ii) heat, and (iii) the Laws of Perfect Gases.
   Solve problems involving theoretical applications of gas laws.
2. define "work done" during compression and expansion of a perfect gas. Solve related problems.
3. define and solve problems on the subject of energy transfer in the form of heat.

Unit 9: Electrical Theory and Circuits

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

1. explain the composition of different elements and their electrical properties.
2. explain and apply Ohm's Law and Kirchoff's Law to simple electrical circuits.
3. explain conductors, resistors and insulators along with their application to simple electrical circuits.
4. solve mathematical calculations for series, parallel and series-parallel circuits.
5. explain and use in a practically applied manner the relationship between work, energy and power.
6. explain and calculate EMF, back EMF, armature reaction and efficiency for direct current machines.

Unit 10: Electrical Applications

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

1. describe ammeters, D.C. voltmeters and ohmmeters instruments and how they should be connected in the circuits.

Unit 11: Practical Electronics

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

1. understand the "application of the term electronics" to describe current flow in particular devices.
2. understand electron emission and their application of the methods employed.
3. understand different types of vacuum tubes and their basic operation in electrical systems.
4. understand why solid state devices have replaced the electron tube.
5. understand the semi-conductor current flow with relationship to electrical characteristics of a PN junction.

Unit 12: Electrical Calculations

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

1. describe electricity as to types and sources.
2. understand direct current relative to circuits, laws and properties and make the applicable calculations.
3. understand work and power as it pertains to calculations in both alternating and direct currents.
4. understand measurement procedures, devices, and methods as they relate to alternating and direct current applications.

Evaluation

The students will be evaluated as follows:

1. Assignments..... 10%
2. Quiz..... 20%
3. Midterm 10%
4. Midterm 10%
5. Final 35%
6. Lab 15%