COLLEGE OF ENGINEERING
MECHANICAL AND ELECTRICAL DEPARTMENT

COURSE NAME: ELECTRONICS II
COURSE ID:
COLLEGE COURSE ID: 5591
UNIVERSITY COURSE ID.: O1127
CACEI ID: CT
STUDY PLAN LEVEL: TEA:VT, TME:VTTT, TMT:VT
CREDITS: 8
NORMAL HOURS PER WEEK: 3
TOTAL HOURS COURSE: 48
LAB HOURS PER WEEK: 2
COMPLEMENTARY PRACTICES:
EXTRA-CLASS WORK HOURS / WEEK: 3
COURSE TYPE: TEA,TMT: REQUIRED; TME: ELECTIVE
APPROVED CREDITS NEEDED:
CURRICULAR LAST REVISION DATE: DECEMBER 2O1O
PREREQUISITE COURSE: ELECTRONTCS T (559O)

COURSE JUSTIFICATION

TECHNOLOGICAL EXPANSION AND INCREASING NEEDS OF MODERN INDUSTRY REQUIRE THAT STUDENTS OF THESE PROGRAMS ARE PROVIDED WITH THE KNOWLEDGE RELATED TO THE USE OF ELECTRONICS IN THE FIELD OF INSTRUMENTATION AND CONTROL, WHERE OPERATIONAL AMPLIFIERS ARE WIDELY USED.

COURSE OBJECTIVE

IT COVERS THE STUDY OF OPERATIONAL AMPLIFIERS AND THEIR MAIN APPLICATIONS IN THE FIELD OF INDUSTRIAL INSTRUMENTATION AND DESIGN OF ELECTRONIC SYSTEMS FOR CONTROL APPLICATIONS.

COURSE TOPICS

UNTT 1
FUNDAMENTALS OF OPERATTONAL AMPLTFTERS

OBJECTTVE: TO SHOW THE FUNDAMENTALS OF OPERATIONAL AMPLIFIER AND ITS BASIC SETTINGS. TT ALSO SHOWS THE CONCEPT OF FEEDBACK.

TOPTCS:
1.1. FUNDAMENTOS DE AMPLIFICADORES.
1.2. EL AMPLIFICADOR OPERACIONAL.
1.3. CONFIGURACIONES BÁSICAS DE AMPLIFICADORES OPERACIONALES.
1.4. ANÁLISIS DEL CIRCUITO IDEAL DEL AMP. OP.
1.5. RETROALIMENTACIÓN NEGATIVA.

1.1 AMPLIFIER FUNDAMENTALS.
1.2. THE OPERATIONAL AMPLIFIER (OP AMP).
1.3. BASIC OP AMP CONFIGURATIONS.
1.4. TDEAL OP AMP CIRCUIT ANALYSIS.
1.5. NEGATIVE FEEDBACK.

UNTT 2
OP AMP LTNEAR CTRCUTTS

OBJECTTVE: STUDENT WILL BE INDUCED TO THE ANALYSIS AND DESIGN OF LINEAR CIRCUITS USING OPERATIONAL AMPLIFIER. COMPENSATION SCHEMES AND SIGNAL CONVERSION WILL BE SHOWED.

TOPTCS:
2.1. DIFFERENCE AMPLIFIERS.
2.2. TNSTRUMENTATION AMPLIFIERS.
2.3. CURRENT AMPLIFIERS.
2.4. CURRENT-TO-VOLTAGE CONVERTERS.
2.5. VOLTAGE-TO-CURRENT CONVERTERS.

UNTT 3
OP AMP NONLTNEAR CTRCUTTS

OBJECTTVE: SE PRESENTA EL ANÁLISIS Y DISEÑO DE LOS CIRCUITOS NO LINEALES EMPLEANDO AMPLIFICADORES OPERACIONALES. ASÍ COMO LAS APLICACIONES MÁS COMUNES DE ÉSTOS.
TT IS SHOWED THE ANALYSIS AND DESIGN OF NONLINEAR CIRCUITS USING OPERATIONAL AMPLIFIERS, AS WELL AS THEIR MOST COMMON APPLICATIONS.

TOPTCS:
3.1. VOLTAGE COMPARATORS.

3.2. SCHMITT TRIGGERS
3.3. PEAK DETECTORS
3.4. LIMITER CIRCUITS WITH OP AMP

UNTT 4
OP AMP ACTTVE FTLTERS

OBJECTTVE: STUDENT WILL BE INTRODUCED TO THE CONCEPT OF FREQUENCY RESPONSE AS WELL AS THE DESIGN OF ACTIVE FILTERS FOR SIGNAL COMPENSATION.

TOPTCS:
4.1. THE TRANSFER FUNCTION.
4.2. FIRST-ORDER ACTIVE FILTERS.
4.3. SECOND-ORDER RESPONSES.
4.4. SECOND-ORDER ACTIVE FILTERS.
4.5. HIGH-ORDER ACTIVE FILTERS (CHEVYSHEV, BUTTERWORTH).

UNTT 5
STGNAL GENERATORS

OBJECTTVE: AN IMPORTANT TOPIC IN THE FIELD OF ELECTRONICS IS THE GENERATION OF SIGNALS FOR MODULATION AND CONTROL. THIS TOPIC IS DISCUSSED IN THIS PART OF THE COURSE, EMPHASIZING THE WAVE GENERATOR DESIGN WITH OP AMP.

TOPTCS:
5.1. MULTIVIBRATORS
5.2. TRIANGULAR WAVE GENERATORS.
5.3. SINE WAVE GENERATORS.

METHODOLOGY

TOPICS EXPOSITION, ANALYSIS OF PRINCIPLES AND EXAMPLES, DISCUSSION OF RESULTS OF NUMERICAL EXERCISES AND ASSIGNMENTS, MIDTERMS, HOMEWORK. EXAMS AND LABS.

EVALUATION CRITERIA

EXAMS AVERAGE 100%
LABORATORY.

TT IS MANDATORY TO HAVE ACCREDITED LABORATORY TO PASS THE COURSE.

BIBLIOGRAPHY

SERGIO FRANCO, DESIGN WITH OPERATIONAL AMPLIFIERS AND ANALOG TNTEGRATED CIRCUITS. SECOND EDITION. MCGRAW- HILL. 1998.

GENE TOBEY, JERALD GRAEME Y LAWRENCE HUELSMAN, AMPLIFICADORES OPERACIONALES DISEÑO Y APLICACIÓN, EDITORIAL DIANA.

ALBERT PAUL MALVINO, PRINCIPIOS DE ELECTRÓNICA. SÉPTIMA EDICIÓN. MCGRAW-HILL. 2OO7.

ARPAD BARNA Y DAN PORAT, OPERATIONAL AMPLIFIERS. SECOND EDITION. JOHN WILEY & SONS. 1989.

D. L. SCHILLING & C. BELOVE, CIRCUITOS ELECTRÓNICOS: DISCRETOS E INTEGRADOS. ALFAOMEGA. 1991