COLLEGE OF ENGINEERING
MECHANICAL AND ELECTRICAL ENGINEERING DEPARTMENT

COURSE NAME: ELECTRONICS I
COURSE ID:
COLLEGE COURSE ID: 559O
UNIVERSITY COURSE ID.:
CACEI ID: CI
STUDY PLAN LEVEL: IEA:V, IME:VI, IMT:V
CREDITS: 12
NORMAL HOURS PER WEEK: 5
TOTAL HOURS COURSE: 8O
LAB HOURS PER WEEK: 2
COMPLEMENTARY PRACTICES:
EXTRA-CLASS WORK HOURS / WEEK: 5
COURSE TYPE: REQUIRED
APPROVED CREDITS NEEDED:
CURRICULAR LAST REVISION DATE: DECEMBER 2O1O
PREREQUISITE COURSE: ELECTRTC CTRCUTTS T (556O)

COURSE JUSTIFICATION

TECHNOLOGICAL EXPANSION AND INCREASING NEEDS OF MODERN INDUSTRY REQUIRE THAT THE STUDENT OF THIS PROGRAM HAVE A BASIC PICTURE, AS COMPLETE AS POSSIBLE, OF ELECTRONICS, IN PREPARATION FOR TRAINING TO SUIT PARTICULAR NEEDS OF EACH INDUSTRY. THE STUDENT OF THE PROGRAMS OF ELECTRICAL AND AUTOMATION ENGINEERING, ELECTRICAL AND MECHANICAL ENGINEERING AND MECHATRONICS ENGINEERING WILL NOT WORK AS ELECTRONIC ENGINEERS, BUT IT IS IMPERATIVE THAT THEY HAVE THE TRAINING TO MEET THE DEMANDS OF THE ADJACENT FIELD TO THE CURRENT SOURCES (CA AND CD) ACCORDING TO THEIR PROFILE, AS IS THE WHOLE AREA OF ELECTRONIC CONTROL APPLIED TO INDUSTRY.

COURSE OBJECTIVE

IT INCLUDES THE STUDY OF ELECTRONIC DEVICES, THEIR CHARACTERISTICS, PARAMETERS, LIMITATIONS AND APPLICATIONS IN THE ORDER PRESENTED IN THE TEXTBOOK. THIS TEXT LARGELY ADHERES TO THE GUIDELINES OF TRAINING IN THE FIELD OF INDUSTRIAL ELECTRONICS AND GRADUATE STUDIES.

COURSE TOPICS

UNTT 1
TNTRODUCTTON TO SEMTCONDUCTORS

OBJECTTVE: STUDENTS WILL REVIEW THE BASIC CONCEPTS OF ATOMIC THEORY, AND UNDERSTAND THE OPERATION OF THE SEMICONDUCTOR.

TOPTCS:
1.1 APPLICATION OF ELECTRONICS.
1.2 ATOMIC MODEL.
1.3 SEMICONDUCTOR DEVICES.
1.4 DOPING OF SEMICONDUCTORS.
1.5 POLARIZATION.

UNTT 2 RECTTFTER DTODE

OBJECTTVE: FAMILIARIZE STUDENTS WITH THE OPERATION OF THE RECTIFIER DIODES, ELECTRICAL CHARACTERISTICS AND OPERATING WITHIN AN ELECTRONIC CIRCUIT.

TOPTCS:
2.1 POLARIZATION OF DIODES AND OPERATION CURVE.
2.2 HALF-WAVE RECTIFIER.
2.3 FULL-WAVE RECTIFIER.
2.4 FULL-BRIDGE RECTIFIER.
2.5 PARAMETERS OF DIODES.
2.6 FILTERS WITH CAPACITOR.
2.7 CD POWER SUPPLIES.

UNTT 3
ZENER DTODES

OBJECTTVE: ANALYZE THE OPERATION OF ZENER DIODES AS VOLTAGE REGULATORS.

TOPTCS:
3.1 FORWARD-BIAS REGION.
3.2 REVERSE-BIAS.
3.3 ZENER DIODE AS A VOLTAGE REGULATOR.
3.4 SPECIFICATIONS AND NOMINAL RATINGS OF ZENER DIODES.

UNTT 4
OPTOELECTRONTC DEVTCES

OBJECTTVE: ANALYZE THE OPERATION OF
OPTOELECTRONIC DEVICES.

TOPTCS:
4.1 CLASSIFICATION OF OPTOELECTRONIC DEVICES.
4.2 PHOTOVOLTAIC CELLS.
4.3 LIGHT-EMITTING DIODES (LED).
4.4 PHOTOTRANSISTORS.
4.5 OPTOCOUPLERS.

UNTT 5
BTPOLAR JUNCTTON TRANSTSTOR OPERATTNG TN THE
ACTTVE REGTON

OBJECTTVE: ANALYZE THE OPERATION OF BIPOLAR
TRANSISTORS AS SIGNAL AMPLIFIERS, WORKING IN THE
ACTIVE REGION OF THE POLARIZATION CURVE.

TOPTCS:
5.1 STRUCTURE OF BIPOLAR TRANSISTORS.
5.2 OPERATION OF THE TRANSISTORS.
5.3 POLARIZATION AND OPERATION.
5.4 COMMON-BASE CONFIGURATION
5.5 COMMON-EMITTER CONFIGURATION.
5.6 COMMON-COLLECTOR CONFIGURATION.
5.7 AMPLIFICATION.
5.8 CASCADING TRANSISTOR (DARLINGTON).
5.9 PARAMETERS THAT AFFECT THE OPERATION
OF BIPOLAR TRANSISTORS.

UNTT 6
BTPOLAR TRANSTSTORS OPERATTNG TN CUTOFF AND
SATURATTON REGTONS

OBJECTTVE: ANALYZE THE OPERATION OF BIPOLAR
TRANSISTORS AS SWITCHES WORKING IN THE CUTOFF
AND SATURATION REGIONS.

TOPTCS:
6.1 OPERATION IN THE CUTOFF REGION.
6.2 OPERATION IN THE SATURATION REGION.
6.3 TRANSISTORS USED AS SWITCHING ELEMENTS.
6.4 CASCADING TRANSISTORS.
6.5 OPERATION OF RELAYS.

UNTT 7
FTELD-EFFECT TRANSTSTORS

OBJECTTVE: ANALYZE THE POLARIZATION AND OPERATION
OF FIELD-EFFECT TRANSISTORS IN ELECTRONIC CIRCUITS.

TOPTCS:
7.1 POLARIZATION OF JFET.
7.2 OPERATION OF JFET.
7.3 AMPLIFICATION WITH JFET.

UNTT 8
TNTRODUCTTON TO OPERATTONAL AMPLTFTERS

OBJECTTVE: KNOW THE PRINCIPLES OF OPERATION OF
OPERATIONAL   AMPLIFIERS   AND   THEIR   BASIC
CONFIGURATIONS..

TOPTCS:
8.1 WHAT IS AN OPERATIONAL AMPLIFIER?
8.2 CHARACTERISTICS OF OPERATIONAL AMPLIFIERS.
8.3 TNVERTING AMPLIFIER.
8.4 NONINVERTING AMPLIFIER.
8.5 UNITY FOLLOWER.
8.6 SUMMING AMPLIFIER
8.7 TNTEGRATOR AND DIFFERENTIATOR.
8.8 APPLICATION OF OPERATIONAL AMPLIFIERS.

UNTT 9
REGULATED POWER SUPPLTES

OBJECTTVE: UNDERSTAND THE PRINCIPLES OF
OPERATION OF A REGULATED POWER SUPPLY AS WELL
AS THE LINEAR REGULATOR CIRCUITS.

TOPTCS:
9.1 CHARACTERISTICS OF POWER SUPPLIES.
9.2 CURRENT LIMITATION.
9.3 THREE-TERMINAL INTEGRATED REGULATORS.
9.4 AMPLIFICATION OF THE OUTPUT CURRENT.

METHODOLOGY

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

DEVELOPMENT OF SIMULATIONS IN SPECIALIZED SOFTWARE FOR ELECTRICAL AND ELECTRONIC CIRCUITS.

EVALUATION CRITERIA

EXAMS AVERAGE   100%
LABORATORY.

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

BIBLIOGRAPHY

TEXT BOOK:

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

RONALD J. TOCCI , CIRCUITOS Y DISPOSITIVOS
ELECTRÓNICOS. NUEVA EDITORIAL TNTERAMERICANA.
1986.

JAMES G. BRAZEE, SEMICONDUCTOR AND TUBE
ELECTRONICS AN INTRODUCTION. HOLT, RINEHART AND
WINSTON. 1968.

COMPLEMENTARY BIBLIOGRAPHY:

E. NORMAN LURCH, FUNDAMENTOS DE ELECTRÓNICA.
CECSA. 1985.

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

ROBERT L. BOYLESTAD, ELECTRÓNICA: TEORÍA DE
CIRCUITOS. CUARTA EDICIÓN. PRENTICE HALL. 1997

SOFTWARE AND TICS

SOFTWARE TO USE:

PSPTCE DE ORCAD, VERSIÓN ESTUDIANTIL
PSPTCE DE ORCAD, VERSIÓN PROFESIONAL
ELECTRONTCS WORKBENCH