Year: First  
Theory: 2 hrs./Week  
Tutorial: -hrs./Week

1) How to read numbers  
2) Plastics  
3) Semiconductors  
4) The photoelectric cell  
5) Thermal power stations  
6) Nuclear power stations  
7) Vectors  
8) Computers  
9) Microprocessors  
10) Rectifiers and power supplies  
11) Grammar points (passive voice, active voice, etc.)  
12) Technical report writing

Recommended Textbook:

A Course in English for Engineering and Science Students  
Aiad Jihad Shams Al-Deen  
University of Technology Publications
Digitale Techniques

Year: first

Theory: 2 hrs/Week

Tutorial: 1 hr/Week

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Introduction to Digital Techniques

Digital & analog quantities, Binary digits, Logic levels, Digital waveforms.

System of Numbers

General number formula: Binary, Octal, Decimal & hexadecimal numbers.

Numbers Base Conversion

Arithmetic operation in different numbers: Complements, Binary codes, BCD, Ex-3 and Gray codes.

Boolean Algebra

Laws & rules of Boolean Algebra, DeMorgans theorms, Simplification using Boolean Algebra.

Canonical & Standard Forms of Digital Logic Gates

NOT, OR, AND, NOR, NAND, EX-OR, and EX-NOR, Negative OR and negative AND.

Karanough Maps

SOP simplification, POS simplification, don’t care condition.

Adders Arithmetic Operation and Processes

Subtractors, Half and Full Adders and Subtractors, Binary Parallel Adders, Binary Serial Adder, Addition and Subtraction of Signed BCD Number.

Functions of Combinational Logic Circuits

Even and odd party generator/checker, Decoders, Encoders, Comparator, Multiplexers & De-multiplexers, Code converters.

Sequential Logic Circuits

Flip Flop (SR, JK, T, D...) Master Slave Flip Flop, Counters (Binary, Decade) Counter Decoding, Flip-Flop applications.


1) **Basic Concepts:**

   Introduction to engineering drawing and its uses as an engineering language in industry, dimensioning, symbols and terms used in drawing, proper use of drawing instruments, use of international metric system, names and dimensions of lines used in drawings.

2) **Lettering and Numerals:**

   Arabic and Latin lettering and numerals.

3) **Drawing of Geometrical Patterns:**

   Drawing various types of geometrical patterns (Tracery), various methods of drawing ellipses, various types of tangents.

4) **Drawing of Sectional Views and Tangents:**

   Drawing according to scale, drawing various views of an actual object projections of all views necessary for a given object, projection of views using first and third angle projection methods.

5) **Isometric Projections:**

   Freehand sketching, proper and reasonable proportions.

6) **Computer Aided Engineering Drawing:**

General Concepts: 4 Hrs.
Hardware, software, and information technology, Types of computer (mainframe, network computer, personal computer, laptop, personal digital assistant) in terms of capacity, speed, cost, and use.

Personal computer System (Hardware): 4 Hrs.
Central Processing Unit, Bus structure, Bios, Memory (RAM, ROM), Input Devices, Output Devices, Storage Devices.

Software: 4 Hrs.
Type of software, Operating System Software, Applications Software (some common software applications such as word processing, web browsing).

Computer Languages: 4 Hrs.

The Origins of The C++ Language: 2 Hrs.
A middle Level Language, A structured Language, The Form of C++ Language Program, Basic Elements of C++ Language, Keywords.

Data Types of C++ Language: 4 Hrs.
Identifiers, Numeric Constants, Integer Numbers, Octal Numbers, Hexadecimal Numbers, Floating Points Numbers, Non-Numerical Constants, Characters, ASCII Tables, Local and Global Variables.

The C++ Language Operators: 8 Hrs.
Arithmetic Operators, Relational and Logical Operators, Bitwise Operators, Other Operators.

Program Control Statements: 10 Hrs.
Selection Statements, Iteration Statements (Loops), Jump Statements, Label, Expressions, Blocks.

Functions: 4 Hrs.
The General Form, Return Statements, Call by Value, Call by Reference, Calling Function with Arrays, Function Prototypes.

Arrays: 8 Hrs.
Single-Dimensional arrays, Two-Dimensional Arrays, Multi-dimensional Arrays, Sorting Array, Index Searching.

Pointers and References: 4 Hrs.
The References, The Pointers, Derived Types, Pointers and Arrays.

The Strings: 4 Hrs.
The String Class, Basic String Manipulations, Searching a String, Comparing Strings.

Text Books


MECHANICAL ENGINEERING  
GEC 105

Year: First  
Theory : 2 hrs./Week  
Tutorial: - hrs./Week

1) Static:  
20hrs.

Force system, units system, parallelogram law, forces + components, resultant of coplanar forces components of force in space, moment of a force, moment of couples, equilibrium: Free body diagram, coplanar system, analysis of trusses, friction: Nature of friction, theory of friction, coefficient of friction, centroids and centers of gravity-centroids of area, centroids determined by integration, moments of inertia: Parallel axes theorem, 2nd moment of area by integration radius of gyration, moment of inertia of composite area.

2) Dynamics:  
15hrs.


3) Thermodynamics:  
15hrs.

Introduction, Active materials and their specification, work and heat in ideal gasses and steam 1st law of thermodynamics practical law in steam and gasses, 2nd law of thermodynamics practical law in steam and gasses.

4) Strength of materials:  
10hrs.

Hook’s law, tension and compression stress, thin-walled cylinders and spheres, combined stress (Mohr’s circle) shear and normal stress, stresses in beams (initial principal).
Limits and Continuity  
9 Hrs.
Definition, properties, limits involving infinity, continuous functions, definition of continuity, properties, defining limits formally with epsilons and deltas.

Trigonometric Functions  
9 Hrs.
Trigonometry, Trigonometric Functions, Graphs, Analytic Geometry, Inverse of trigonometric functions, Differentiation and Integration.

Hyperbolic Functions  
9 Hrs.

Transcendental Functions  
6 Hrs.

Applications of Derivatives  
6 Hrs.
Related rates of changes, maxima, minima, and mean value theorem, curve sketching With y' and y", graphing rational functions-Asymptotes and Dominant terms, Optimization.

Methods of Integration  
18 Hrs.

Applications of the Definite Integral  
12 Hrs.
i) areas between curves. ii) Volumes of revolution. iii) Length of the curve. iv) Surface Area by revolution.

Complex Numbers  
6 Hrs.
i) Invented number systems. ii) The Argand diagram. iii) Addition, Subtraction, Product, Quotient, Power and Roots. iv) Demoiver’s theorem.

Vector Algebra  
6 Hrs.
Representation of Vectors in space (i, j, …., k) unit vectors) ii) Scalar Product iii) Vector Product.

Matrices and Determinants  
9 Hrs.

Recommended references:

Calculus: Finney / Thomas.
PHYSICAL ELECTRONIC AND MATERIALS  
GEC 107

Year: First  
Theory: 2 hrs./Week  
Tutorial: hrs./Week

Energy Levels and Atomic Structure  
8 Hrs.


Magnetic & Dielectric Materials  
6 Hrs.

Introduction to magnetism, Basic definitions, Types of Magnetic materials - hard and soft - dia, para and ferro magnetic materials. Magnetic bubbles - formation and propagation of magnetic bubbles - applications of magnetic materials - Floppy disk and CD ROM. Dielectrics - basic definitions, internal or local electric field -definition and derivation of Lorentz equation. Clausius Mosotti equation - Dielectric Loss and properties.

Electrical Conduction in Metals  
6 Hrs.

Mobility and conductivity, Energy distribution of electrons, Fermi level, Work function, Super-Conductivity.

Semiconductors  
10 Hrs.

Semiconductors materials ( Si , Ge and Compound Semiconductors ) , Extrinsic semiconductors, Fermi – Level in Semiconductor, Diffusion and carrier life time, Hall effect .

Semiconductor p – n Junction  
10 Hrs.

p-n junction in equilibrium, Current–Voltage characteristics, Charge control description of a diode transition and diffusion capacitances , Diode switching times, Diode models, Small–signal model and load line concept, Varactor Diode, Tunnel Diode.

Other Types of Semiconductor Diodes  
10 Hrs.

Photodiode and photovoltaic (solar) cell, Light–emitting diode, Principle and operation of semiconductor laser, Electronic ballistics semiconductor diode, Hetero-junctions and double hetero-junctions.

Bipolar and Filed Effect Unipolar Transistor  
10 Hrs.

Construction, fundamentals, Carrier distribution and characteristics for BJT, JFET, MOSFET (depletion and enhancement) and CMOS.

Text Books:-

1- J. C. Anderson and K. D. leaver, Material Science, Prentice- Hall.

2- B. G. Streetman, Solid State Electronic Devices, Prentice- Hall.

3- R. J. Tocci, Electronic Devices, Prentice- Hall.
Basic Electrical Quantities - Introduction 4 Hrs.
System of units (revision), scientific notations, current and voltage, Ohm's law, conductors, semiconductors, and insulators. Energy and power.

The Resistance 4 Hrs.
Resistance types, temperature effect, color coding and standard values, conductance, series and parallel combinations.

Electric Fields and Capacitors 6 Hrs.
The electric field, dielectric strength, capacitance, types of capacitors, energy stored by a capacitor, capacitors in series and in parallel.

Magnetic Fields and Inductors 6 Hrs.
Magnetic fields, flux density, permeability, reluctance, magnetizing force, hysteresis, air gaps, series and series parallel magnetic circuits. Faraday's law of electromagnetic induction, Lenz's law, self inductance, types of inductors, induced voltage, energy stored in an inductor.

Sources and Source Conversion 4 Hrs.
Independent and dependent sources, voltage and current sources, source conversion, dc and ac energy sources, internal resistance and inductance, voltage regulation, sources in series and in parallel, Millman's theorem.

Sinusoidal Alternating Quantities 6 Hrs.
General format for sinusoidal voltage or current, phase relation, average, peak, and RMS values, response of R, L, C elements to sinusoidal voltage or current average power and power factor. Review of mathematical operations with complex numbers, and phasors.

Basic Circuit Analysis 10 Hrs.
Circuit elements and reciprocals, KVL and KCL application to dc and ac circuits, nodal and mesh format approach in formulating the circuit equations. Star-mesh transformation (Rosen's theorem), the Y-delta and delta-Y transformations. Current and voltage divider rules.

Network Theorems and Reduction 10 Hrs.
Thevenin's and Norton's theorems, superposition, reciprocity, and substitution principals, maximum power theorem. Application in dc and ac networks.

Electric Power in DC and AC Circuits 4 Hrs.
Power, efficiency. Apparent, active, and reactive powers in ac circuits, the power triangle.

Resonance in AC Circuits 6 Hrs.
Series resonance, the quality factor, frequency response and half power frequencies. Parallel resonance and frequency response. Introductory filter principals.

Recommended Available Textbooks
Introductory Circuit Analysis ", R. L. Boylestad.
"Electrical Technology ", E. Hughes
The workshop training program is designed to satisfy the following objectives:

- Teaching safety rules and regulations on site in an industrial environment.
- Proper use of working tools, instruments, and machines.
- Introducing basic workshop practices, production, labor, and time requirements of workshop operations.

The students are introduced to training programs in nine workshops:

Electrical, welding, forging, fitting, turning and milling, carpentry, plumbing, auto-mechanics, and casting.

The student is to spend 18 hours of training in every workshop.