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**Department of Communication Engineering**

**Common to all Divisions**

 **Technical English I CE 1101**

 Year : FIRST Theoretical : 1 hr./Week

 Tutorial : - hrs/Week

**Grammar Review 5Hrs.**

**Technical Report Writing 2Hrs.**

**How to read numbers 2Hrs.**

**Semiconductors 2Hrs.**

**The photoelectric cell 2Hrs.**

**Computers 2Hrs.**

**Textbook:**

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

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**Department of Communication Engineering**

**Common to all Divisions**

**Mathematics I CE 1102**

 Year : FIRST Theoretical : 4hrs/Week

 Tutorial : - hrs/Week

 **Limits and Continuity 12Hrs.**

Definition, properties, limits involving infinity, continuous functions, definition of continuity, properties, defining limits formally with epsilons and deltas.

**Trigonometric Functions 12Hrs.**

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

 **Hyperbolic Functions**  **12Hrs.**

i) Definition, ii) Properties iii) Graphs iv) Inverse of hyperbolic functions. v) Differentiation and Integration.

 **Transcendental Functions** **12Hrs.**

 Inverse functions, Natural Logarithmic, Exponential and Power.

i) Definitions ii) Properties iii) Graphs iv) Derivatives and Integrals.

 **Applications of Derivatives 12Hrs.**

 Related rates of changes, maxima, minima, and mean value theorem, curve sketching With y' and y'' ,

 graphing rational functions-Asymptotes and Dominant terms, Optimization.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Computer Science I CE 1103**

 Year : FIRST Theoretical :1 hrs/Week

 Practical : 1 hr. /Week

**General Concepts 2Hrs.** 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) 2Hrs.** Central Processing Unit, Bus structure, Bios , Memory (RAM, ROM), Input Devices, Output Devices, Storage Devices.

**Software 2Hrs.** Type of software, Operating System Software, Applications Software (some common software applications such as word processing, web browsing).

**Computer Languages 2Hrs.**

Low Level Language , High Level Language , Middle Level Language , Compiler. Flowchart Introduction & Method of Problem Solving, Definition of Algorithm and Flowchart, Basic Symbols of flowchart.

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

**Data Types of C++ Language 2Hrs.** Identifiers, Numeric Constants, Integer Numbers, Octal Numbers, Hexadecimal Numbers, Floating Points Numbers, Non-Numerical Constants, Characters, ACSII Tables, Local and Global Variables.

**The C++ Language Operators 3Hrs.** Arithmetic Operators, Relational and Logical Operators, Bitwise Operators, Other Operators.

**Text Books**

1. [Herbert Schildt](http://www.amazon.com/s/ref%3Drdr_ext_aut?_encoding=UTF8&index=books&field-author=Herbert%20Schildt), [Gregory L. Guntle](http://www.amazon.com/s/ref%3Drdr_ext_aut?_encoding=UTF8&index=books&field-author=Gregory%20L.%20Guntle), "Borland C++ Builder: The Complete Reference", McGRAW-Hill companies, 2001.

2. Ira Pohl, "C++ By Dissection: the essentials of C++ Programming", Addison-Wesley, 2001.

3. Irv Englander, "The Architecture of Computer Hardware and Systems Software: An Information Technology Approach", John Wiley & Sons, Inc., publisher, 3rd edition, 2003.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Electronics I CE 1104**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : 1 hr./Week

**Diode Circuit Applications 8Hrs.**

Rectification, Clipping, Clamping, Voltage Multipliers, Logic Elements, Zener Diode Characteristics and Applications.

**Bipolar Transistor Circuits 8Hrs.**

BJT : Construction, Operation, Configurations and Characteristics, Operating Regions, Load–Lines, The Transistor as an Amplifier, DC Biasing Circuits and Stability, Power Dissipation, Switching Transistors, The BJT Inverter, Break-

Down Voltages.

**BJT Small-Signal Analysis 8Hrs.**

Transistor Equivalent Circuits, Voltage and Current Gain, Input and Output Impedance , Low and High Frequency Operation.

**FET Transistor and Circuits 6Hrs.**

Construction and Characteristics of JFET, MOSFET Construction and Characteristics, CMOS , DC Biasing Circuits.

 **Textbook:**

 **Boylested R.L. ,** Electronic Devices and Circuit Theory, Prentice – Hall Int Pub .

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**Department of Communication Engineering**

**Common to all Divisions**

 **Engineering Drawing CE 1105**

 Year : FIRST Practical : 3 hrs/Week

 **Basic Concepts** **6Hrs.**

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.

 **Lettering and Numerals**  **3Hrs.**

 Arabic and Latin lettering and numerals.

 **Drawing of Geometrical Patterns** **12Hrs.**

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

 **Drawing of Sectional Views and Tangents** **12Hrs.**

 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.

 **Isometric Projections** **12Hrs.**

 Freehand sketching, proper and reasonable proportions.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Digital Techniques CE 1106**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : - hrs/Week

**Introduction to Digital Technique 2Hrs.**

**Basic definitions 2Hrs.**

**System of numbers 2Hrs.**

General number formula: Binary, octal, decimal & hexadecimal numbers.

**Numbers base conversion 4Hrs.**

Arithmetic operation in different numbers, complements, binary codes, BCD, Ex- 3, gray codes.

**Boolean algebra 4Hrs.**

Basic definitions, basic theorem and properties, Boolean functions.

**Canonical & standard forms digital logic gates 4Hrs.**

**Karanough maps 4Hrs.**

AND and OR implementation, don’t care condition.

**Adders arithmetic Operation and Processes 4Hrs.**

Subtractors, Half and Full Adders and Subtractors, Binary Parallel Adders, Binary Serial Adder, Addition and Subtraction of Signed BCD Number, ABCD Adder and Arithmetic Unit (ALU) .

**Code conversion 4Hrs.**

Even and odd party logic, decoders, encodes comparator, multiplexers & demultiplexers.

 **Text Books:**

1. T. Floyd, “Digital Fundamentals” , Charles E. Merrill Publishing Company .
2. M.Morris Mano, “DigitalDesign”, Prentice Hall.

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**Department of Communication Engineering**

**Optical & Communication Systems Engineering Division**

 **Physics of Semiconductors CEO 1107**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : - hrs/Week

**Energetic and crystal structure of semiconductors 6Hrs.**

 Historical and technical background of semiconductors Atomic structure and Miller coefficients Atoms, electrons and the Bohr model Silicon crystal, insulator and conductor energy band model Electron-hole pair generation and recombination Electron Effective Mass Intrinsic semiconductor Extrinsic semiconductor .

**Charge carrier concentration and energy band description 6Hrs.**

 Steady state concentration Fermi function Steady state carrier distribution Degenerate semiconductor Energy band and Fermi level .

**Charge carrier processes: Drift, Diffusion, Generation and Recombination 8Hrs.**

Carrier drift and mobility Specific conductivity and resistivity Generation and recombination Transient state carrier concentration Minority carrier lifetime Carrier diffusion Drift -diffusion current Continuity equation Diffusion equation Steady state diffusion equation .

**p-n junction diode 10Hrs.**

Structure, Electrical characteristic, Variable/abrupt graded junction, Diode manufacturing Steady state p-n diode Current components, Energy band distribution, Potential, Charge, and Electrical field distribution in a pn junction. Forward and Reverse biased p-n junction .

Carrier injection Introduction to junction diffusion-drift processes, Minority carrier diffusion distribution, Diffusion current components equation, Diode equation Diode breakdown mechanisms AC/DC model, Dynamic resistance, Charge capacitance, Junction capacitance, Forward/reverse bias schematic, Breakdown voltages: Zener and Avalanch .

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**Department of Communication Engineering**

**Common to all Divisions**

 **Electrical Engineering Fundamentals I CE 1108**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : 1 hrs/Week

**Circuit Variables and Circuit Elements 6Hrs.**

System of units, voltage and current, circuit elements, voltage and current sources, electrical resistance and conductance, Ohm's and Kirchoff's laws, power and energy.

**Circuit Transformations 6Hrs.**

Resistances in series and parallel, source transformation, current and voltage division , delta-star and star-delta transformations.

 **Electric Fields and Capacitors** **4Hrs.**

 The electric field, dielectric strength, capacitance, types of capacitors, energy stored by a capacitor , capacitors in

 series and in parallel **.**

 **Magnetic Fields and Inductors 6Hrs.**

 Magnetic fields, flux density, permeability, reluctance, magnetizing force, hysteresis, air gaps,

 series and series parallel magnetic circuits. Faraday' law of electromagnetic induction, Lenz's

 law, self inductance, types of inductors, induced voltage, energy stored in an inductor.

**Sinusoidal Alternating Quantities**  **8 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 .

 **Textbook :**

Boylestad , R. L., Introductory Circuit Analysis ( 4th Edition ) .

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**Department of Communication Engineering**

**Common to all Divisions**

 **Workshops I CE 1109**

Year : FIRST Practical : 4 hrs/Week

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.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Technical English II CE 1201**

 Year : FIRST Theoretical : 1 hr./Week

 Tutorial : - hrs/Week

 **Elements of Communication Systems 2Hrs.**

 **Types of Communication Systems 2Hrs.**

 **Transmission Lines 2Hrs.**

 **Wireless Communications 2Hrs.**

 **Optical Fiber Communications 2Hrs.**

 **Radar Systems 2Hrs.**

 **Modulation Techniques 2Hrs.**

 **Multiplexing Techniques 1 Hr.**

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**Department of Communication Engineering**

**Common to all Divisions**

 **Mathematics II CE 1202**

 Year : FIRST Theoretical : 4hrs/Week

 Tutorial : - hrs/Week

 **Methods of Integration** **24Hrs.**

1. i) Trigonometric Substitutions ii) Quadratics iii) Partial Fractions
2. iv) Integration by parts v) Rational functions and partial fractions
3. vi) Numerical Integration (Trapezoidal and Simpson) rules.
4.

 **Applications of the Definite Integral**  **12Hrs.**

1. i) areas between curves. ii) Volumes of revolution. iii) Length of the curve.

iv) Surface Area by revolution.

 **Complex Numbers**  **8Hrs.**

1. Invented number systems. ii) The Argand diagram.

iii) Addition, Subtraction, Product, Quotient, Power and Roots.

iv) Demoiver’s theorem.

 **Vector Algebra**  **8Hrs**.

i)Representation of Vectors in space (i, j,…..k) , unit vectors .

ii) Scalar Product iii) Vector Product.

 **Matrices and Determinants** **8Hrs.**

 i) Definitions. ii) Properties. iii) Inverse of a matrix. iv) Solution of Equations (Cramer’s rule). v) System of linear equations (Gauss elimination). vi) Rank of a matrix.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Computer ScienceII CE 1203**

 Year : FIRST Theoretical :1 hrs/Week

 Practical : 1 hr. /Week

**Program Control Statements 5Hrs.** Selection Statements, Iteration Statements (Loops), Jump Statements, Label , Expressions, Blocks**.**

**Functions 2Hrs.** The General Form, Return Statements, Call by Value, Call by Reference, Calling Function with Arrays, Function Prototypes.

**Arrays 4Hrs.** Single-Dimensional arrays, Two-Dimensional Arrays, Multi-dimensional Arrays, Sorting Array, Index Searching.

**Pointers and References 2 Hrs.** The References, The Pointers, Derived Types, Pointers and Arrays.

**The Strings 2Hrs.** The String Class, Basic String Manipulations, Searching a String , Comparing Strings.

**Text Books**

1. [Herbert Schildt](http://www.amazon.com/s/ref%3Drdr_ext_aut?_encoding=UTF8&index=books&field-author=Herbert%20Schildt), [Gregory L. Guntle](http://www.amazon.com/s/ref%3Drdr_ext_aut?_encoding=UTF8&index=books&field-author=Gregory%20L.%20Guntle), "Borland C++ Builder: The Complete Reference", McGRAW-Hill companies, 2001.

2. Ira Pohl, "C++ By Dissection: the essentials of C++ Programming", Addison-Wesley, 2001.

3. Irv Englander, "The Architecture of Computer Hardware and Systems Software: An Information Technology Approach", John Wiley & Sons, Inc., publisher, 3rd edition, 2003.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Measurements & Instrumentations CE 1204**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : - hr./Week

**Systems of Units and Standards of Measurement 2Hrs.**

Systems of units, International system of units, electrical standard, time and frequency Standards , IEEE standards.

**Measurement and Error 4Hrs.**

Definitions, accuracy, precision, resolution, composition of measuring system ,selection factors and trends, types of error: gross, systematic, random, and limiting errors.

**Instruments for Measuring Basic Electrical Parameters 6Hrs.**

Electromechanical and electric instruments: design, static and dynamic characteristics. Meter readings , error and compensation.

**Bridges and their Applications 6Hrs.**

DC and AC bridges: basic electrical parameters measurement, frequency measurement.

**Oscilloscopes 4Hrs.**

CRT deflection, probes and functions, measuring techniques, types.

**Transducers 4Hrs.**

Position , pressure, velocity, acceleration, force, torque, temperature, Photosensitive transducers.

**Data Recording Instruments 4Hrs.**

Chart recorders, magnetic recorders, graphic plotters, data loggers.

**Textbook:**

Cooper and Helfrick , Electronic Instrumentation & Measuring Techniques. Prentic -Hall Pub **.**

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**Department of Communication Engineering**

**Common to all Divisions**

 **Auto CAD Engineering Drawing CE 1205**

 Year : FIRST

 Practical : 3 hrs/Week

  **Creating a Simple Drawing 9Hrs.**

 Getting Started with AutoCAD , Starting AutoCAD , AutoCAD's Screen Layout , Working with Commands , Opening an Existing Drawing File , Saving Your Work , AutoCAD's Cartesian Workspace , More advance 2D AutoCAD commands .

 **Basic Drawing & Editing Commands 6Hrs.**

 Drawing Lines , Erasing Objects , Drawing Lines with Polar Tracking , Drawing Rectangles , Drawing Circles , Drawing different electrical & electronic symbols and circuits , Viewing Your Drawing , Undoing and Redoing Actions .

**Making Your Drawings More Precise 6 Hrs.**

 Drawing Precision in AutoCAD , Using Object Snap , Object Snap Overrides , Polar Tracking Settings

 Object Snap Tracking , Drawing with SNAP and GRID .

**Making Changes in Your Drawing 6 Hrs.**

 Selecting Objects for Editing . Moving Objects , Copying Objects , Rotating Objects , Scaling Objects

 Mirroring Objects , Editing Objects with Grips .

**Drawing Organization and Information 6 Hrs.**

 Organizing Your Drawing with Layers , Creating New Drawings With Templates , What are Layers?

 Layer State , Changing an Object's Layer .

**Advanced Object Types 6 Hrs.**

 Drawing Arcs , Drawing Polylines , Editing Polylines , Drawing Polygons , Drawing Ellipses .

Getting Information From Your Drawing , Measuring Objects , Working with Properties .

**3D AutoCAD commands 6 Hrs.**

 Viewports , 3D annotation , applications .

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**Department of Communication Engineering**

**Common to all Divisions**

 **Probability & Statistics CE 1206**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : 1 hr./Week

**Probability: 6Hrs.**

Introduction, Set definitions and operations, Joint and conditional Probability, Bayes’ Theorem, Independent events .

**The Random Variable 6Hrs.**

The Random variable concept, Discrete and continuous random variables, Mixed random variables, Probability density function, Probability Distribution functions, Gaussian random variable.

**Discrete Distributions & Continuous Distributions 6Hrs.**

**Statistics of Random Variables 3Hrs.**

 Expectation, Moments, Transformations of a random variable.

 **Multiple Random Variables & Operations on Multiple Random Variables 3Hrs.**

 Vector random variables,, Joint density and distribution functions, Statistical independence, Central limit theorem, multiple random variables.

 **Random Processes 3Hrs.**

Deterministic and nondeterministic processes, Correlation functions .

**Spectral Characteristics of Random Processes 3 Hrs.**

Power spectral density, autocorrelation function, White and colored noise **.**

**Text Book:**

 "Probability, Random Variables, and Random Signal Principles", Peyton Z. Peebles, 4th edition, McGraw-Hill, Inc, 2001.

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**Department of Communication Engineering**

**Optical & Communication Systems Engineering Division**

 **Physics of Materials CEO 1207**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : - hrs/Week

 **Conducting Materials 4Hrs.**

Relaxation Time and Electrical Conductivity. Sources of Resistivity of Metals and Alloys, Electrical Conductivity at High Frequencies. Geometrical and Magnetic Field Effects on Electrical Conductivity. Types of Conducting Materials.

**Dielectric Materials 4Hrs.**

Types of Electric Polarization, Frequency and Temperature Effects on Polarization, Dielectric Loss, Dielectric Breakdown, Insulating Materials, Ferro-electric Materials, Electrets.

**Magnetic Materials 4Hrs.**

Types of Magnetic materials, Ferro and Ferri magnetism, Hard and Soft Magnetic materials, Ferrites – Microwave applications, Magnetic bubbles.

**Super Conducting Materials 2Hrs.**

Types of Super Conductors, High Tc Super Conductors and High Frequency Applications.

**Passive Optical Materials 10Hrs.**

Glasses: silicates, fluoride, chalcogenides, origin of color in glasses , Polymers: optical constants, specialty optical applications, polarization , Crystals: polarization, birefringence, wave plates, liquid crystals , Metals: physical origin of the dielectric constant, reflectance, surface plasmons , Passive optical components: lenses; optical coatings; mirrors; gratings , Optical waveguides: thin films (slab); optical fibers; mode equations and profiles, mode cutoff.

**Active Optical Materials** **6Hrs.**

 Semiconductors: interband absorption ; direct, indirect bandgap ; Si, III-V; II-V , Semiconductors: nanoscale phenomena , excitons, quantum confinement ,Semiconductors: organic semiconductors; small molecules; conjugated polymers **.**

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**Department of Communication Engineering**

**Common to all Divisions**

 **Electrical Engineering Fundamentals II CE 1208**

 Year : FIRST Theoretical : 2 hrs/Week

 Tutorial : 1 hrs/Week

**Techniques of Circuit Analysis 4Hrs.**

Basic terminology, the loop current method, the node voltage method, circuit theorems:

Superposition , Thevenin's , Norton's , reciprocity , and maximum power transfer.

  **Resonance in AC Circuits 4Hrs.**

Series resonance, the quality factor, frequency response and half power frequencies. Parallel resonance and

 frequency response. Introductory filter principals.

 **Three Phase Networks 4Hrs.** Three phase voltage sources, phase sequence, line and phase quantities, analysis of YY, YD, DY, DD connected circuits, power calculations and measurements in three phase circuits, the method of symmetrical components.

 **Two Port Networks 6Hrs.** Introduction, terminal equations, two port parameters (z, y, h, and ABCD), equivalent circuits, interconnected two ports.

 **Locus Diagrams 4Hrs.** Concept, locus diagrams of simple series and parallel circuits.

 **Circuits with Mutual Inductance 4Hrs.** The concept of mutual inductance, polarity and the dot convention, the ideal transformer, equivalent circuits for magnetically coupled coils.

 **Electric Transients (Classical Method) 4Hrs.** The natural and forced response of series and parallel circuits, circuits with zero initial conditions.

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**Department of Communication Engineering**

**Common to all Divisions**

 **Workshops II CE 1209**

 Year : FIRST Practical : 4 hrs/Week

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.