Integral University
STUDY & EVALUATION SCHEME
B.Tech. First Year (Common to all Branches)

Year 1st, Semester II

Sl. No	Course Category.	Subject Code	Name of the Subject	Periods				Evaluation Scheme				Subject Total
								Sessional (CA)			End Sem. Exam. (ESE)	
				L	T	P	C	CT	TA	Total		
10.	BS	CH-101/ PY-101/ PY-102	Chemistry / Physics / Physics for Bioengineering (BT & FT)	3	1	-	4	25	15	40	60	100
11.	ES/ HM	ES-101/ LN-101	Environmental Studies / Professional Comm.-I	2	1	-	3	25	15	40	60	100
12.	BS	MT-112/ MT-113	Mathematics – II / Mathematics-II for Bioengineering (BT & FT)	3	1	-	4	25	15	40	60	100
13.	ESA	ME-101/ EN-101	Basic Mechanical Engineering/ Basic Electrical Engineering	3	1	-	4	25	15	40	60	100
14.	ESA	CS-101/ EC-101	Computer Programming/ Basic Electronics	3	1	-	4	25	15	40	60	100
15	BS	CH-102/ PY-104	Chemistry Lab / Physics Lab	-	-	2	1	30	30	60	40	100
16.	ESA	ME-102/ EN-102	Mechanical Engineering Lab / Electrical Engineering Lab	-	-	2	1	30	30	60	40	100
17.	ESA	CS-102 ME-103	Computer Programming lab / Engineering Graphics	-	-	2	1	30	30	60	40	100
18	HM ESA	LN-151/ ME-104/	Professional Comm. Lab / Workshop Practice	-	1	2	2	30	30	60	40	100
19	ESA	BE-101	Introduction to Bioengineering (BT & FT)	2	0	2	**	30	30	60	40	100
	Total			14 / 16	6 / 6	8 / 10	24	245	195	440	460	900

** A non credit foundation course. Candidate has to pass the course by securing at least 50 % marks up to second semester

L – Lecture   **T** – Tutorial   **P** – Practical   **C** – Credit**s**   **CT** – Class Test   **TA** – Teacher Assessment

Sessional Total (CA) = Class Test + Teacher Assessment

Subject Total = Sessional Total (CA) + End Semester Examination (ESE)

BS – Basic Sciences   **DC** – Departmental Core

HM – Humanities   **OE** – Open Elective

DE – Departmental Elective   **ESA** – Engineering Sciences & Arts (Foundation Course
                                  & Engineering Courses)

CHEMISTRY (CH-101)

L T P
UNIT I   **3 1 0**

1. Molecular theory of heterodiatomic molecules, Band theory of bonding in metals, Hydrogen bonding.
2. Solid state chemistry: Radius ratio rule, Space lattice (only cubes), Type of unit cell, Bragg's Law, Calculation of density of unit cell. One and Two Dimensional solids, Graphite as two dimensional solid and its conducting properties. Fullerene and its applications.

UNIT II

1. Basic principles of spectroscopic methods. The use of UV, Visible, IR, ^{1}HNMR, for the determination of structure of simple organic compounds.
2. Characteristics and classification of polymers.
3. Structures of the polymers: Natural and synthetic rubbers, Polyamides and polyester fibers, Polymethylmethacrylate, Polyacrylonitrile and Polystyrene. A brief account of conducting polymers (polypyrrole and polythiophene) and their applications.

UNIT III

1. Stability of reaction intermediates, *e.g.* Carbanions, Carbocations and free radicals. Types of organic reactions, and mechanism of nucleophilic substitution reactions.
2. Mechanism of following reactions.
   1. Aldol condensation (ii) Cannizzaro reaction (iii) Beckmann rearrangement (iv) Hofmann rearrangement and (v) Diels-Alder reaction.
3. E-Z Nomenclature. Optical isomerism of organic compounds containing one chiral center. Examples of Optically active compounds without chirality. Conformations of n-butane.

UNIT IV

1. Order and molecularity of reactions. First and second order reactions. Energy of activation.
2. Phase Rule, its application to one component system (water).
3. Equilibrium potential, electrochemical cells (galvanic and concentration cells), Electrochemical theory of corrosion and protection of corrosion.

UNIT V

1. Classification of fuels, Coal, Biomass and Biogas. Determination of gross and net calorific values using Bomb Calorimeter.
2. First law of thermodynamics and its mathematical statement, heat, energy and work; Heat content or Enthalpy of a system; Thermochemistry: Hess's law of constant heat summation, Heat of reaction, Heat of combustion, Heat of neutralization, Heat of formation, Heat of fusion, Heat of vaporization, Heat of sublimation, Heat of solution and Heat of dilution (only definition and explanation).
3. Hardness of water, softening of water by Lime-Soda process, Zeolites and ion-exchange resins process and Reverse Osmosis. Treatment of boiler feed water by Calgon process.

REFERENCE BOOK:
1. Engineering Chemistry by Jain and Iain.
2. Engineering Chemistry by R. K. Agrawal

PHYSICS (PY-101)

Unit I: Electrostatics-   **8**
Boundary conditions and Boundary value problems in electrostatics, The Uniqueness theorem, Laplace and Poisson's equations in electrostatics and their applications, method of electrical images and their simple applications, energy stored in discrete and continuous system of charges.

Unit II: Wave Optics-   **8**
Methods of formation of coherent sources, **Theory of Interference**, Fresnel's Biprism, **Displacement of Fringes**, thin film interference, Newton's ring. Fraunhoffer diffraction at single slit and grating, Rayleigh's criterion of resolution, resolving power of grating.

Unit III: Optical activity and Modern Optics-   **8**
Production of plane polarized light by reflection and Double refraction, Nicol prism. Optical activity, **Fresnel's theory**, polarimeter (Laurentz and Biquartz).
Principle of fiber optics, numerical aperture, attenuation, dispersion in optical fibers, material dispersion, waveguide dispersion, intermodal and intramodal dispersion, Pulse dispersion in step index fiber, Main components of laser, Einstein's coefficients, He-Ne laser, Nd-YAG laser and their applications.

Unit IV: Properties of Matter and Relativistic Mechanics-   **8**
Viscosity, Poiseulli's equation, Frame of reference, Michelson-Morley experiment and its implications, Galilean transformation equations, Einstein's postulates, Lorentz transformation equations and their consequences, energy mass relation, **relativistic kinetic energy**.

Unit V: Quantum Physics-   **8**
Compton effect, Basic postulates of quantum mechanics, Wave function and its physical admissibility, orthogonality and normalization of wave functions, Heisenberg's uncertainty principle(no derivation) and its applications to (non-existence of electron in nucleus, Bohr's radius), Schrodinger's equation and its application to particle in 1-D box and finite well.

ENVIRONMENTAL STUDIES (ES-101)

Unit-I
Multidisciplinary nature of Environmental Science and Natural Resources

Multidisciplinary nature of Environmental studies
Definition, Scope and Importance of Environmental Science and Need of public awareness.
Natural resources
Renewable and non-renewable resources
Natural resources and associated problems.
> **a. Forest Resources:**
> > Use and over Exploitation , Deforestation, case studies. Timber
> > extraction, Mining, dams and their effects on forests and tribal people.
> **b. Water Resources:**

Use and over utilization of surface and ground water, Floods, Drought, Conflicts over water, dams- benefits and problems.
> **c. Mineral Resources:**
> > Use and exploitation, environmental effects of using and extracting minerals
> > resources, case studies.
> **d. Food Resources:**
> > World food problems, Changes caused by agriculture and over grazing,
> > effects of modern agriculture, fertilizer pesticide problems, Water
> > logging, Salinity, case studies.

e. Energy Resources:
Growing energy needs, renewable and nonrenewable energy sources, use of alternative energy sources, case studies.
> **f. Land Resources:**
Land as resource, Land degradation, Man induced land slides, Soil erosion
and desertification.
> > - Role of individual in conservation of resources
> > - Equitable use of resources for sustainable life style

Unit-II
Ecosystem
> Concept of an Ecosystem
> Structure of Ecosystem, Function of Ecosystem
> Producer Consumer and decomposers
> Energy flow in the Ecosystem
> Ecological Succession
> Food chains, Food web, Ecological Pyramids
> **Introduction, types, characteristics features structure and function of the**
> **following ecosystem:**

a- Forest Ecosystem
b- Grassland Ecosystem

c- Desert Ecosystem,
d- Aquatic Ecosystem:(Ponds, streams, lakes, rivers, oceans, estuaries)

Unit-III
Biodiversity and its conservation

Introduction Definition of Biodiversity: Genetic, Species and Ecosystem diversity, Bio-Geographical classification of India, Value of Bio-diversity: Consumptive, productive , Social, ethical, aesthetic and optional values, Biodiversity at Global, National & Local levels, India as a Mega Diversity Nation, Hotspots of Biodiversity, Threats to Biodiversity, Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts,Endangered species of India IUCN Red data book, Endemic species of India, Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-IV
Environmental Pollution

Environmental Pollution
Definition
        Causes, effects and control measures of
                -Air Pollution
                -Water Pollution
                -Soil Pollution:
                -Marine Pollution:
                -Noise Pollution:
                -Thermal Pollution
                -Nuclear Hazards

Solid Waste Management:
-Causes, Effects and Control measures of Urban and Industrial Wastes. -Role of an Individual in prevention of pollution.
-Pollution case studies
Disaster Management: Floods, Earthquake, Cyclones and Landslides.

Unit-V
Social Issues and the Environment

From unsustainable development to sustainable development, Urban problems related to Energy, Water conservation, Rain water Harvesting, Water shed

management, Resettlement and Rehabilitation of people; its problems and concerns, case studies, Environmental ethics: issues and possible solutions Wasteland reclamation , Consumerism and waste product.

Environment protection Act, Air (prevention and control of Pollution) Act, Water(prevention and control of Pollution) Act, wildlife protection Act, Forest conservation act, Issues involved in Enforcement of Environmental Legislation, Public Awareness.

Human Population and the Environment
Population growth variation among nations, Population Explosion, Family   welfare programme, Environment and Human Health, Human Rights, Value education, HIV/AIDS, Women and Child welfare, Role of Information Technology in Environment and Human Health.

Suggested field work
Visit to local area to document environment assets river/ forest/ grassland/ hill/ mountain, visit to local polluted site urban/ rural/ industrial/ agricultural, study of common plants, insects, birds, study of simple ecosystems pond river,hill slopes etc.

PROFESSIONAL COMMUNICATION –I (LN-101)

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UNIT I *Introduction to Communication*   04 HRS
Definition, Types of Communication, Channels of Communication, Language

UNIT II *Interpersonal Communication*   06 HRS
Culture- Definition and Types, Communication and Culture including Cross Cultural Communication

UNIT III *Written Communication*   08 HRS
Letter Writing- Informal and Formal - Letters of Enquiry, Letters of complaint, Response to complaints and enquiries, Self Exploration through description

UNIT IV *Grammar through Worksheets*   12 HRS
Situational activities and modules- Parts of Speech, Tenses, Articles, Modals, Active and Passive, Subject-Verb Agreement, Direct and Indirect Speech, Degrees of comparison

UNIT V *Grammar through Worksheets Continued*   10 HRS
Sentences: Simple, Compound, Complex, Declarative, Assertive, Negative, Interrogative, Exclamatory, Imperative

RECOMMENDED BOOKS:

1. Wren PC and Martin H, "High School Grammar and Composition", S. Chand and Co.

2. K. Floyd , "Interpersonal Communication: The Whole Story" (2009), McGraw Hill,

3. Greenbaum Sidney and Nelson Gerald, "An Introduction To English Grammar", Pearson

4. Swan Michael, "Practical English Usage" OUP, 2005

5. Raymond Murphy, " Intermediate English Grammar", (2007) Cambridge University Press

MATHEMATICS-II (MT-112)

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Unit-I Differential Equations 10
Linear differential equations of first order, Linear differential equations of higher order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation) .

Unit-II : Laplace Transform 9
Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step function, Dirac-delta function, Laplace transform of periodic functions, Convolution theorem, Applications to solve simple linear and simultaneous differential equations.

Unit-III : Fourier Series and Partial Differential Equations 10
Periodic functions, trigonometric series , Fourier series of period 2π, Euler's formulae, functions having arbitrary period, change of interval, Even and odd functions, Half range sine and cosine series.

Introduction of partial differential equations, linear partial differential equations with constant coefficients of second order and their classifications to parabolic, elliptic and hyperbolic forms with illustrative examples.

Unit-IV: Applications of Partial Differential Equations 7
Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Laplace equation in two-dimensions, Heat conduction equations up to two dimensions, Equations of transmission Lines.

Unit-V: Curve fitting and Solution of Equations 6
Method of least squares , curve fitting of straight line and parabola, Solution of cubic and biquadratic equations.

Reference Books:
1. E. Kreyszig   Advanced Engineering Mathematics,
                        Wiley Eastern Ltd.
2. Jaggi and Mathur   Advanced Engineering Mathematics, Khanna Pub.
3. B. S. Grewal   Higher Engineering Mathematics, Khanna Pub.
4. Dennis G. Zill   Advanced Engineering Mathematics, CBS Pub.

BASIC MECHANICAL ENGINEERING (ME-101)

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A. FUNDAMENTALS OF THERMODYNAMICS

Unit –I
Fundamental Concepts and Definitions:
Definition of Thermodynamics, System, surrounding and universe, Phase, Concept of continuum, Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Property, State, Path, process, Cyclic process, Energy and its form, Work and heat, Enthalpy.   **3**
Laws of thermodynamics:
Zeroth law: Concepts of Temperature, Zeroth law.   **1**
First law: First law of thermodynamics. Concept of processes, Flow processes and control volume, Flow work, Steady flow energy equation, Mechanical work in a steady flow of process.   **4**
Second law : Essence of second law, Thermal reservoir, Heat engines, COP of heat pump and refrigerator. Statements of second law, Carnot cycle, Clausius inequality. Concept of Entropy.   4

Unit –II
Properties of steam and thermodynamic cycles :
Properties of steam, Use of property diagram, Steam tables, Processes involving steam in closed and open systems. Ranking cycle
Introduction to I.C. Engines: Two, four stoke S.I. and C.I. engines. Otto cycle, Diesel cycle.   **4**

B. MECHANICS AND STRENGTH OF MATERIALS

Unit-III
Force system and Analysis:
Basic Concept: Laws of motion. Transfer of force to parallel position, Resultant of planer force system. Free Body diagrams, equilibrium and its equation.   **4**
Friction: Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry fiction belt friction.   **2**

Unit –IV
Structure Analysis :
Beams: Introduction, Shear force and bending moment, Shear and bending moment diagram for statically determinate beams.   **4**
Trusses: Introduction, Simple Trusses, Determination of forces in simple trusses members,   methods   of   joints   and   method   of   section.
4

Unit-V
Stress and Strain Analysis :
Simple Stress and strain: Introduction, Normal shear stresses, Stress-strain diagrams for ductile and brittle materials, Elastic constants, One dimensional loading of members of varying cross sections, Strain Energy. **4**

Pure Bending of Beams
Introduction, Simple bending theory, Stress in beams of circular,rectangular andtriangular cross section. **2**
Torsion: Introduction, Torsion of shafts of circular section, Torque and Twist, Shear stress due to Torque. Comparison of hollow and solid circular shafts. **4**

Reference:
1. Van Wylen G.J. & Sonnlog R.E. Fundamentals of Classical Thermodynamics, John Wiley & Sons, Inc. NY.
2. Wark Wenneth: Thermodynamics (2nd edition) Mc Graw Hill Book Co. NY.
3. Holman, J.P.: Thermodynamics, Mc Graw Hill Book Co.NY.
4. Shames I.H., Engineering Mechanics, P.H.I.
5. D.S. Kumar, Mechanical Engineering, S.K. Katarial & Sons.
6. Bhavi Katti S.S., Engineering Mechanics, New Age Pub.
7. P.K. Bharti: Engineering Mechanics, Kataria and Sons.
8. R.K. Rajput, Mechanical Engineering, Laxmi Pub.

BASIC ELECTRICAL ENGINEERING (EN-101)

UNIT-1
D.C CIRCUIT ANALYSIS AND NETWORK THEOREMS
Circuit concepts: Concept of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R L and C as linear elements, source transformation, Kirchoff's Law: loop and nodal methods of analysis, star delta transformation, network theorems: Thevenin's theorem, Norton's theorem, maximum power transfer theorem.   (8)

UNIT-2
STEADY STATE ANALYSIS OF SINGLE PHASE AC CIRCUITS
AC fundamentals: Sinusoidal, square and triangular waveforms-average and effective value, form the peak factors, concept of phasors, phasors representation of sinusoidally varying voltage and current, analysis of series-parallel RLC circuits. Apparent, active and reactive powers, power factor, causes and problems of low power factor, power factor improvement, resonance in series and parallel circuits, bandwidth and quality factors.
                                                                                          (8)
UNIT-3
THREE PHASE AC CIRCUITS
Three phase system: Its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relation, three phase power measurements.
MEASUREMENT INSTRUMENTS
Types of instruments: construction and working principle of PMMC and MI type voltmeter and ammeters, single phase dynamometer type wattmeter and induction type energy meter, use of shunts and multipliers.   (8)

UNIT-4
INTRODUCTION OF POWER SYSTEM: general layout of electrical power system and function of its elements, standard transmission and distribution voltages, concept of grid.
MAGNETC CIRCUIT
Magnetic circuit: Concepts, analogy between electric and magnetic circuit, magnetic circuits with DC and AC excitation, magnetic leakage, BH curve, hysteresis and eddy current losses, magnetic circuit calculation, mutual coupling.
Single Phase Transformer: Principle of operation, construction, emf equation, equivalent circuit, power losses, efficiency, Introduction to auto transformers.   (8)

UNIT-5
Principle of Electromechanical energy conversion
DC Machines: Types, emf equation of generator and torque equation of motor, characteristics and applications of DC motors.
Three Phase Induction Motor: Type, principle of operation, slip-torque Characteristics, applications.

Single Phase Induction Motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor, applications. (8)

References:

2.V.Deltoro, "Principle of Electrical Engg." PHI.

3.M.A Mallick, Dr. I. Ashraf, "Fundamental of Electrical Engg," Word Press, Lucknow.

4.A. Hussain, "Basic Electrical Engg" Dhanpat Rai & sons.

5.I J Nagrath,"Basic Electrical Engg" ,TMH

COMPUTER PROGRAMMING (CS-101)
w.e.f. Session 2015-16

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UNIT -1
Introduction to Computers: Generation of computers, Characteristic and classifications of computers.
Components of Computer: CPU, Various I/O Devices, **Memory & its types** , (Memory Hierarchy, Storage Media), Computer Software and their types, Operating System.
Computer Networks & Communication: LAN, MAN, WAN, Network Topologies, Modes of Data Communication.
Introduction to Internet and its Safeguard: Internet Addresses, Domain Name System, URL, Web Browsers Search Engines, Firewalls , Anti-Virus, **Translators**.
Algorithm and flowchart: Algorithm and flow chart characteristics, Sketching Flowcharts of various problems. [09]

Unit 2
Starting C: Standard I/O in 'C', 'C' Fundamental, C Character set, Constants, Variables, Keywords and Identifiers, Data types, Declaration. Operators and Expressions, Conditional statements (If, If-else), Nesting of if- else statement, switch statement, The**?:** operator, goto statement.
Decision making and Looping (While, Do-While, for), Break and Continue statements, Case Control Structures (Switch), **C programs based on above concepts**. [08]

Unit 3
Introduction to pointers: declaration and initialization of pointers, accessing the address of the variable, accessing the variable through the pointer, chain of pointers, pointers operators, pointer arithmetic
Introduction to Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value; Call by Reference; Nesting of Functions, Recursion. Pointers with function, **C program based on above concept** [09]

Unit 4
Array: Concept of One Dimensional and Multi Dimensional arrays, Declaration,
Operations: insert, delete, search, traverse, and merge, matrix operations, **Sorting**: Bubble sort, merge sort, insertion sort.
Character array and strings: declaring and initializing strings variable, reading and writing a character, reading and writing strings from terminal, Arithmetic operations on characters, string handling functions. Application of pointers, and function on array, **C program based on above concept** [10]

Unit 5
Structures: Defining Structure, Declaration of Structure Variable, Accessing Structure members, copying and comparing structure variable, operation on individual member, nesting of structures, Array of structures. Application of pointers and function on Structures.
Union Defining Union Declaration of Union, difference between structure and Union, **Introduction of Static and Dynamic memory allocation-** The process of Dynamic memory allocation, , **C program based on above concept.**   [08]

References:
1. Foundation of Information Technology by 'D.S. Yadav'- New age International
2. Programming in 'C' by 'E Balagurusamy'.-TMH Publication.
3. Let us 'C' by 'Yashwant Kanitkar'-BPB Publication.
4. The C Programming Essentials by Dey- Pearson Publication.

BASIC ELECTRONICS (EC-101)

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UNIT-I
Semiconductor Diode
Mechanism of Conduction in Semiconductors: Mobility and Conductivity, Electrons and holes in an
intrinsic semiconductors, Donor and acceptor impurities, Fermi level, Carrier densities in semiconductor, Hall effect, Diffusion, Recombination
Junction Diode
PN junction characteristic and its equation, Effect of Temperature, Depletion Layer, Piecewise linear
diode model, Breakdown Mechanism, Zener and Avalanche Breakdown characteristics
Diode as circuit element
Half wave and full wave rectifiers, capacitive filters, Zener diode as a regulator, clamper, clipper and
voltage doubler, **special diode**- LED, Schottkey diodes

(8)

UNIT-II
BJT characteristics and circuits
Transistor Operation, CE, CB, CC configuration and their characteristics, transistor biasing circuits,
stability factor, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistor
CE amplifier configuration.

(8)

UNIT-III
Field Effect Transistors
JFET: Construction and principle of working,
Drain / Transfer characteristics, basic amplifier circuits, Biasing of JFET
MOSFET: Enhancement and depletion type N-channel, P-channel, Drain / Transfer Characteristics.

(8)

UNIT-IV
Switching theory & Logic gates
Number system, Conversion, Compliments, Addition and Subtraction, BCD numbers, Boolean algebra, Canonical form, Logic gates, Minimization of logical function using Karnaugh map

(8)

UNIT-V
Operational Amplifier
Concept of ideal operational amplifier (inverting and non-inverting) and its applications, Inverter, integrator, differentiator, voltage follower, summing and differential amplifier
Electronic Instruments: Digital Multimeter (block diagram approach), CRO (block diagram and its

working),Measurement of voltage, phase, frequency. Double beam CRO (block diagram & its
working).

(8)

Text Books
1. Bolyested& Nashekey / Electronic Devices and Circuit Theory, PHI
2. Milliman & Halkias: Integrated Electronics , Mc Graw Hill
3. J. S. Katre: Electronics Engineering, Tech-Max Publication

CHEMISTRY LAB (CH-102)

List of Experiments

1. To determine the Iron content in the given iron ore by using external indicator.

2. To determine the Alkalinity in the given water sample

3. To determine the Chloride content in the given water sample by Mohr's method.   (Argentometric method)

4. To determine the Percentage of Available Chlorine in the given sample of Bleaching   powder iodometrically.

5. To determine the temporary and permanent hardness in water sample by Complexometric titration using EDTA as standard solution.

6. To determine the Equivalent weight of Iron by Chemical Displacement method. (The Equivalent weight of Copper is 63.5)

7. To determine the strength of given HCl solution by titrating it against NaOH solution using pH meter.

8. To determine the iron concentration in the given water sample by Spectrophotometer using potassium thiocyanate as colour developing agent.

9. To detect the presence of functional groups in the given organic compound.

10. To detect the presence of Elements in the given organic compound.

PHYSICS LAB (PY-104)

1. To determine the wave length of monochromatic light by Newton's ring.

2. To determine the wave length of monochromatic light with the help of Fresnel's Biprism.

3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.

4. To determine the specific rotation of cane sugar solution using Biquartz polarimeter.

5. To determine the wavelength of spectral lines using plane transmission grating.

6. To determine the Brewster's angle and refractive index of material with the help of a laser source.

7. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.

8. To verify Stefan's law by electrical method.

9. To determine the energy band gap of a given semiconductor material.

10. To determine the viscosity of a liquid.

MECHANICAL ENGINEERING LAB (ME-102)

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List of Experiments

1. To study and sketch the model of fire tube (Lancashire and Locomotive) boiler.
2. To study and sketch the model of water tube (Babcock & Wilcox) boiler.
3. To study and sketch the model of two stroke S.I. Engines.
4. To study and sketch the model of four stroke S.I. Engines.
5. To study and sketch the model of four stroke C.I. Engines.
6. To study and sketch the model of vapour compression refrigerator.
7. To study and sketch the model of simple steam engine.
8. To determine the Rockwell hardness no. of a given specimen using hardness tester.
9. To perform the tensile test on specimen and determine the different mechanical properties with the help of UTM.
10. To determine the impact strength of mild steel by Izod method using impact testing machine.
11. To perform the compression test on brick and determine the ultimate compressive strength with the help of UTM.

ELECTRICAL ENGINEERING LAB (EN-102)

List of Experiments:

1.Verification of Thevenin's Theorem.

2.Verification of Superposition Theorem.

3.Verification of Maximum Power Transfer Theorem.

4.To study V-I characteristics of diode.

5.To study the input & outputcharacteristics of BJT in CE configuration.

6.To study the full wave rectifier circuit with &without filter and determine the ripple factor.

7.To study the phenomenon of resonance in series RLC circuit.

8.Determination of losses in single phase transformer by OCT and SCT.

9.To calibrate a single phase induction type energy meter.

10.To study the running and reversing of a three phase SCIM.

11.Study of OP Amp based inverting and non inverting amplifier.

COMPUTER PROGRAMMING LAB (CS-102)

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1. Programs based on basic concepts of C. (e.g. Addition, Subtraction, Multiplications, Swapping of numbers, Conversions, area calculation, interest calculation…etc)
2. Programs based on Conditional statement.
3. Programs based on loop Conditions (FOR, WHILE, DO- WHILE).
4. Programs based on Single & Two dimensional Array (Insertion, deletion, Multiplication, searching, etc...).
5. Programs based on Pointers.
6. Programs based on Function call (Call by value and call by reference).
7. Programs based on recursion.
8. Programs based on Strings and its operations.
9. Programs based on Structures and its operations.
10. Programs based on Miscellaneous Concepts.

ENGINEERING GRAPHICS (ME-103)

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1. **Introduction**
   Engineering graphics as a tool to communicate ideas, Lettering and dimensioning. Construction of geometrical figures like pentagon and hexagon.

2. **Orthographic Projection**
   Principles of orthographic projections Principal and auxiliary planes, First and Third angle projections.
   Projection of points. Pictorial view.
   Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes.
   Application to practical problems.
   Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other plane, solids lying on a face or generator on a plane.
   Sectioning of solids lying in various positions, True shape of the section.
   Development of lateral surfaces, sheet metal drawing.

3. **Isometric Projection**

Principles of isometric projection, Isometric projection using box and offset methods.

References:

1. Bhatt. N.D. : Elementary Engineering Drawing Charothar Publishing.
2. Laxmi Narayan V and Vaish W: A Text Book of Practical Geometry and Geometrical drawing.

PROFESSIONAL COMMUNICATION LAB (LN-151)

Day 1. Introductions (Instructors, Students and Curriculum)

Day 2. Listening exercises

Day 3. Framing Questions

Day 4. Making Small talks

Day 5. Presentation Making- tips, do's and don'ts/ group presentations

Day 6. Group presentations

Day 7. Phonetic alphabet

Day 8. Phonetic transcription

Day 9. Intonation

Day 10. Stress

Day 11. . Working on Negotiations

Day 12- 14Situational conversational section- Social language, emergency situations/ seeking help, inquiries, communicating bad news

Day 15: Exercise on cross cultural communication

WORKSHOP PRACTICE (ME-104)

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0	**0**	**3**

1. **Machine Shop**
   a. Study of tools and operations
   b. Plane turning
   c. Step turning
   d. Taper turning
   e. Threading
   f. Single point cutting tool grinding.

2. **Fitting Bench Working Shop**
   a. Study of tools and operations
   b. Simple exercises involving filing work.
   c. Making perfect male-female joint
   d. Simple exercises involving drilling/tapping/dieing

3. **Black Smithy Shop**
   a. Study of tools and operations
   b. Simple exercises based on black smithy operations such as upsetting drawing down, punching, bending, fullering and swaging

4. **Welding Shop**
   a. Study of tools and Operations
   b. Simple butt joint
   c. Lap Joint
   d. Oxy acetylene welding

5. **Sheet Metal Shop**
   a. Study of tools and Operations
   b. Making funnel complete with soldering.
   c. Fabrication of tool box, tray, electrical panel box etc.

6. **Carpentry Shop**
   a. Study of tools and Operations and carpentry joints.
   b. Simple exercise using jack plain.
   c. To prepare half lap corner joint, mortise and tennon joints.
   d. Simple exercise on woodworking lathe.

7. **Foundry**
   a. Making a mould using single piece pattern .
   b. Making a mould using two piece pattern
   c. Making a mould using a pattern with core print
   d. Melting Pouring and Making an Aluminium Casting.