

Integral University Lucknow
Study & Evaluation Scheme
B. Tech. (Electrical Engg.)

| 1 st YEAR | | SEMESTER-I | | | | | | | | |
|------------------------|-------------|------------------------------|---------|---|---|------------|----|----------------|---------------|-------|
| S. No | Course Code | Subject | Periods | | | Evaluation | | | Subject total | |
| | | | L | T | P | Sessional | | End Sem. Exam. | | |
| | | | | | | CT | TA | | | Total |
| THEORY SUBJECTS | | | | | | | | | | |
| 1. | IEN-101 | Basic Electrical Engineering | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 150 |
| 2. | IEC-101 | Basic Electronics | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 150 |
| 3. | IPH-101 | Physics | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 150 |
| 4. | IMA-101 | Mathematics-I | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 150 |
| 5. | IPC-101 | Professional Communication-I | 3 | 1 | 0 | 30 | 20 | 50 | 100 | 150 |
| 6. | IEL-101 | English Language & Grammar | 2 | 1 | 0 | 15 | 10 | 25 | 75 | 100 |

Practical/Training/Project

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|--------------|---------|----------------------|-----------|-----------|-----------|------------|------------|------------|------------|-------------|
| 7. | IEN-151 | Electrical Engg.Lab | - | - | 03 | 10 | 10 | 20 | 30 | 50 |
| 8. | IPH-151 | Physics Lab | - | - | 03 | 10 | 10 | 20 | 30 | 50 |
| 9. | IWS-151 | Workshop Practice | - | - | 03 | 10 | 10 | 20 | 30 | 50 |
| 10. | ICE-151 | Engineering Graphics | - | - | 03 | 10 | 10 | 20 | 30 | 50 |
| 11. | IGP-101 | General Proficiency | - | - | - | - | - | 50 | - | 50 |
| Total | | | 17 | 06 | 12 | 180 | 175 | 405 | 695 | 1100 |

BASIC ELECTRICAL ENGINEERING IEE-101/201

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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, kirchoffa laws: 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.

MAGNETIC 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 autotransformers. (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:

1. V.deltoro, "Principle of Electrical Engg." PHI.
2. M.A Mallick, Dr. I. Ashraf, "Basic Electrical Engg," word Press, Lucknow.
3. A.Hussain, "basic Electrical Engg" Dhanpat Rai & sons.
4. I.J. Nagrath, 'Basic Electrical Engg.' TMH

ELECTRICAL ENGINEERING LAB IEN-151

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LIST OF PRACTICALS

A minimum of 10 experiments from the following:

1. Verification of Thevenin's theorem.
2. Verification of Superposition theorem.
3. Verification of maximum power transfer theorem.
4. To study of V-I characteristics of diode.
5. To study the input characteristics of BJT in common emitter 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 a single phase transformer by open circuit and short circuit test.
9. To calibrate a single phase induction type energy meter.
10. To study the running and reversing of a three phase squirrel cage induction motor.
11. Measurement of efficiency of a single phase transformer by load test.
12. Study of a star delta circuits with DC supply.
13. To increase the range of voltmeter using high series resistance.

BASIC ELECTRONICS (EC-101/EC-201)

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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 A_i , A_v , R_i , R_o 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

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

References:

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
4. Sedra and Smith / Microelectronic Circuits/ TMH

PHYSICS IPH-101 / IPH-201

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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. Fraunhofer 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, Poiseuille'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.

PHYSICS PRACTICALS IPH151/251

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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.

MATHEMATICS-I
IMA 101

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Unit-I : Matrices

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Introduction, Elementary row and column transformations, Rank of matrix, Linear dependence, Consistency of linear system of equations, characteristic equation, Caley-Hamilton Theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices.

Unit II: Differential Calculus-I

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n^{th} derivative, Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables.

Unit-III : Differential Calculus-II

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Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

Unit-IV : Multiple Integrals

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Double and triple integrals, Change of order of the Integration, Change of variables, Beta and Gamma functions, Application to area and volume, Dirichlet's integral and its applications.

Unit-V : Vector Calculus

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Point functions, Gradient, divergence and curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems.

Refrence Books:

1. Shanti Narayan A Text Book of Martices, S. Chand & Co.
2. Thomas/Finny Calculus and Analytical Geometry, Narosa House.
3. B.S. Grewal . Higher Engineering Mathematics, Khanna Publishers,
4. Piskunov, M. . Differential and Integral Calculus, Peace Pub.
5. Jaggi and Mathur : Advanced Engineering Mathematics, Khanna
6. C. Prasad . Mathematics for Engineers, Prasad

PROFESSIONAL COMMUNICATION PC 101/ 201

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| UNIT I Introduction to Communication Definition, Types of Communication, Channels of Communication, Language | 04 |
| UNIT II Interpersonal Communication Culture- Definition and Types, Communication and Culture including Cross Cultural Communication | 06 |
| UNIT III Written Communication Letter Writing- Informal and Formal - Letters of Enquiry, Letters of complaint, Response to complaints and enquiries, Self Exploration through description | 08 |
| UNIT IV Grammar through Worksheets Situational activities and modules- Parts of Speech, Tenses, Articles, Modals, Active and Passive, Subject-Verb Agreement, Direct and Indirect Speech, Degrees of comparison | 12 |
| UNIT V Grammar through Worksheets Continued Sentences: Simple, Compound, Complex, Declarative, Assertive, Negative, Interrogative, Exclamatory, Imperative | 10 |

Reference:

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

ENGLISH LANGUAGE, GRAMMAR AND SOFT SKILLS EL 101/201

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| UNIT 1 | 06 |
| Language Tools: Euphemism, one word substitution, synonym, antonym, homophones, idioms and phrases, common mistakes, confusable words and expressions. | |
| UNIT II | 06 |
| Reading and Comprehension: Based on short stories and essays | |
| UNIT III | 06 |
| Social Grace and Business Etiquette Introductions and Greeting, Business Etiquettes-Dress, Telephone, Email, Dining and Interview | |
| UNIT IV | 04 |
| Team Spirit Defining a Team, Teamwork, Types of teams, Leadership skills | |
| UNIT V | 08 |
| Behavioural Traits: Attitude, Motivation, Personality, Time Management and Decision Making | |

Reference:

1. Robbins S.P, Judge T.A and Sanghi S, "Organizational Behavior", Pearson, 13th Edition, 2009
2. Post Peggy, Post Anna and Senning Daniel Post, "Emily Post's Etiquette" 18th Edition
3. Word Power Made Easy by Norman Lewis, Goyal Publishers, 2009
4. Michael McCarthy and Felicity O' Dell, "English Vocabulary in Use", (2002) Cambridge University Press

WORKSHOP PRACTICE IWS-151/251

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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.

ENGINEERING GRAPHICS ICE-151/251

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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 Charohtar Publishing.
2. Laxmi Narayan V and Vaish W: A Text Book of Practical Geometry and Geometrical drawing.