# Integral University Lucknow

## Study & Evaluation Scheme

## B. Tech. (Electrical Engg.)

**YEAR I, Semester-I**

| S. No. | Subject Code | Category | Subject | Periods | | | | Evaluation Scheme | | | | Subject Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Sessional | | | Exam. | |
| | | | | L | T | P | C | CT | TA | Total | ESE | |
| **Theory Subjects** | | | | | | | | | | | | |
| 1 | PY 101 | BS | Physics | 3 | 1 | 0 | 4 | 25 | 15 | 40 | 60 | 100 |
| 2 | LN101 | HM | Professional Communication-I | 2 | 1 | 0 | 3 | 25 | 15 | 40 | 60 | 100 |
| 3 | MT101 | BS | Mathematics I | 3 | 1 | 0 | 4 | 25 | 15 | 40 | 60 | 100 |
| 4 | EN101 | ESA | Basic Electrical Engg. | 3 | 1 | 0 | 4 | 25 | 15 | 40 | 60 | 100 |
| 5 | EC101 | ESA | Basic Electronics | 3 | 1 | 0 | 4 | 25 | 15 | 40 | 60 | 100 |
| 6 | PY102 | BS | Physics Lab | 0 | 0 | 2 | 1 | 30 | 30 | 60 | 40 | 100 |
| 7 | EN102 | ESA | Electrical Engg. Lab | 0 | 0 | 2 | 1 | 30 | 30 | 60 | 40 | 100 |
| 8 | ME103 | ESA | Engg Graphics | 0 | 1 | 2 | 1 | 30 | 30 | 60 | 40 | 100 |
| 9 | ME104 | ESA | Workshop Practice | 0 | 0 | 2 | 2 | 30 | 30 | 60 | 40 | 100 |
| | | | **Total** | **14** | **6** | **8** | **24** | **245** | **195** | **440** | **460** | **900** |

**L-**Lecture **T-T**utorial **P-**Practical **C**-Credits **CT-**Class Test **TA-**Teacher Assessment

**Sessional Total (CA)** = Class Test + Teacher Assessment

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

**BS-** Basic Science **DC-** Departmental Core

**HM-** Humanities **OE-** Open Elective

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

**PHYSICS (**PY101**)**

**(w.**e.f. Session: 2015-16)

| **L** | **T** | **P** |
|---|---|---|
| 3 | 0 | 0 |

**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.

**PHYSICS LAB (**PY102**)**

**(w.**e.f. Session: 2015-16)

| **L** | **T** | **P** |
|---|---|---|
| 0 | 0 | 2 |

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.

**PROFESSIONAL COMMUNICATION-I (**LN101**)**
**(w.**e.f. Session: 2015-16)

**L T P**
2 1 0

**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

**PROFESSIONAL COMMUNICATION LAB (**LN151**)**

**(w.**e.f. Session: 2015-16)

| **L** | **T** | **P** |
|---|---|---|
| 0 | 1 | 2 |

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

**BASIC ELECTRICAL ENGINEERING (**EN101**)**

**(w.**e.f. Session: 2015-16)

**Credits: 04**

**L T P**

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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, 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.

**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:**


1. V.Deltoro, "Principle of Electrical Engg." PHI.
2. M.A Mallick, Dr. I. Ashraf, "Fundamental of Electrical Engg," CBS Publishers.
3. A. Hussain, "Basic Electrical Engg" Dhanpat Rai & sons.
4. I J Nagrath,"Basic Electrical Engg" ,TMH

**ELECTRICAL ENGINEERING LAB (**EN102**)**

**(w.**e.f. Session: 2015-16)

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**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 & out put characteristics 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.

**BASIC ELECTRONICS (**EC101**)**

**(w.**e.f. Session: 2015-16)

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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. (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 (8)

**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).

**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

**Reference Books:**

Sedra and Smith / Microelectronic Circuits/ TMH

**Integral University, Lucknow**

**Department of Mathematics**

**B. Tech. 1st year** **1st sem**

**Subject: Engineering Mathematics-I (common to all branches except BT & FT)**
**Subject Code: MT101**

**(Revised w.e.f. session 2015-2016)**

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**Unit-I : Matrices** [8]

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

**Unit II: Differential Calculus-I** [8] $n^{th}$ derivative, Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables.

**Unit-III : Differential Calculus-II** [8] Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

**Unit-IV : Multiple Integrals** [8] 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** [8] 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.

**Reference 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 |