

# PANJAB UNIVERSITY, CHANDIGARH

## SYLLABI OF FIRST YEAR COURSES IN B.E. (Information Technology)

### Semester I

S.No	Subject	Code	L-T-P	Credits Theory	Credits Practical	University External Marks	University Internal Marks	Practical Marks Internal	Total Marks
1.	Calculus	MATHS101	4-1-0	4		50	50		100
2.	Introduction to Information Technology	IT101	3-1-0	4		50	50		100
3.	Programming Fundamental	CS101	3-0-2	3	1	50	50	50	150
4.	Physics Course 1	-	4-0-3/4-0-2	3	1	50	50	50	150
5.	Ethics and Self-Awareness	HSS101	2-0-0	2		50	50		100
6.	Basic Electrical Engineering	EE-E101	3-0-2	3	1	50	50	50	150
Total			28/27	19	3	300	300	150	750

### Semester II

S.No	Subject	Code	L-T-P	Credits Theory	Credits Practical	University External Marks	University Internal Marks	Practical Marks Internal	Total Marks
1.	Differential Equations and Transforms	MATHS201	4-1-0	4		50	50		100
2.	Communication Skills	HSS202	2-0-0	2		50	50		100
3.	Physics Course 2	-	4-0-3/4-0-2	3	1	50	50	50	150
4.	Workshop Practice	ME203	0-0-4		2			50	50
5.	Introduction to Environmental Science	GS201	3-0-0	3		50	50		100
6.	Introduction to Electronics	EC202	3-0-2	3	1	50	50	50	150
Total			26	15	4	250	250	150	650

## SEMESTER I

**Paper Title : Calculus**  
**Paper Code : MATHS101**

**Pre Requisite : 10+2**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Course Duration: 45 lectures of one hour each.**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### Objectives

- To understand the behaviour of infinite series and its use.
- To learn the concepts of functions of two and more than two variables and their applications.
- To learn the methods to evaluate multiple integrals and their applications to various problems.
- To understand the concepts of Vector calculus and their use in engineering problems.

S. No.	Topic	No. of Lectures
	<b>PART A</b>	
1.	<b>FUNCTIONS OF ONE VARIABLE</b> Sequences and Series: Sequences, Limits of sequences, Infinite series, series of positive terms, Integral test, Comparison test, Ratio test, Root test. Alternating series, Absolute and Conditional Convergence, Leibnitz test. Power series: radius of convergence of power series, Taylor's and Maclaurin's Series, Formulae for remainder term in Taylor and Maclaurin series, Error estimates. (Scope as in Chapter 8, Sections 8.1 – 8.10 of Reference 1). Integral Calculus: Areas of curves, Length of curves, Volume and surface areas of revolution (Scope as in Chapter 5, Sections 5.1, 5.3, 5.5, 5.6 of Reference 1).	9
2.	<b>DIFFERENTIAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES</b> Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, Euler's theorem for homogeneous functions, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor's theorem, Errors and increments, Maxima and minima of a function of two and three variables, Lagrange's method of multipliers (Scope as in Chapter 12, Sections 12.1 – 12.6, 12.8 – 12.9 of Reference 1).	9

<b>3.</b>	<b>SOLID GEOMETRY</b> Cylinder, Cone, Quadric surfaces, Surfaces of revolution. (Scope as in: 10.6, 10.7 of Reference 1).	<b>3</b>
<b>PART B</b>		
<b>4.</b>	<b>INTEGRAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES</b> Double and triple integrals, Change of order of integration, Change of Variables, Applications to area, volume and surface area. (Scope as in Chapter 13 of Reference 1).	<b>9</b>
<b>5.</b>	<b>VECTOR DIFFERENTIAL CALCULUS</b> Vector-valued functions and space curves, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative (Scope as in Chapter 11, Sections 11.1, 11.3, 11.4, Chapter 12, Section 12.7 of Reference 1).	<b>8</b>
<b>6.</b>	<b>VECTOR INTEGRAL CALCULUS</b> Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green's theorem in the plane, Surface Areas and Surface Integrals, Stoke's Theorem, Gauss Divergence Theorem (Statements only) (Scope as in Chapter 14 of Reference 1).	<b>7</b>

### **Outcomes**

- The students are able to test the behavior of infinite series.
- Ability to analyze functions of more than two variables and their applications.
- Ability to evaluate multiple integrals and apply them to practical problems.
- Ability to apply vector calculus to engineering problems

### **References:**

1. G. B. Thomas, R. L. Finney. Calculus and Analytic Geometry, Ninth Edition, Pearson Education.
2. E. Kreyszig. Advanced Engineering Mathematics, Eighth Edition, John Wiley.
3. Michael D. Greenberg. Advanced Engineering Mathematics, Second Edition, Pearson Education.
4. Advanced Engineering Mathematics, Wylie and Barrett, McGraw Hill
5. B. V. Ramana. Higher Engineering Mathematics, Tata McGraw Hill.
6. R. K. Jain, S. R. K. Iyenger. Advanced Engineering Mathematics, Narosa Publications.

**Paper Title : Introduction to Information Technology**

**Paper Code : IT101**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

**Course Duration: 45 lectures of one hour each.**

### **Part-A**

#### **Computer Basics (10)**

Algorithms, A Simple Model of a Computer, Characteristics of Computers, Problem-solving Using Computers. Representation of Characters in computers, Representation of Integers, Representation of Fractions, Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes. Description of Computer Input Units, Other Input Methods, Computer Output Units(Printers ,Plotters).

#### **Processor (10)**

Structure of Instructions, Description of a Processor, Machine Language and Instruction set . processors used in desktops and lap tops. Memory Cell, Memory Organization, Read Only Memory, Serial Access Memory, Physical Devices Used to Construct Memories, Magnetic Hard Disk, floppy Disk Drives, Compact Disk Read Only Memory, Magnetic Tape Drives. Specification of a desktop and Lap top computer currently available in the market (Specifications of processor,motherboard &chipset, memory, interface & capacity of hard disk & DVD drives, I/O ports)

### **Part-B**

#### **Computer Architecture (5)**

Interconnection of Units, Processor to Memory communication, I/O to Processor Communication, Interrupt Structures, Multiprogramming, Processor Features, Reduced Instruction Set Computers (RISC), Virtual Memory.  
**Software Concepts:** Types of Software, Programming Languages, Software (Its Nature & Qualities), Programming Languages.

## **Operating Systems (5)**

History and Evolution. Main functions of OS Multitasking ,Multiprocessing,Time Sharing ,Real Time OS with Examples

## **Database Management System (2)**

Purpose and Organization of Database ,Introduction to Data Models

**Computer Generation & Classifications:** First Generation of Computers, The Second Generation, The Third Generation, The Fourth Generation, The Fifth Generation, Moore's Law, Classification of computers, Distributed Computer System, parallel computers.

## **Computers & Communications (5)**

Introduction to Computer Communications, Introduction to Computer Networks, Types of Networks, OSI/TCP Model, LAN technologies (fast Ethernet & Gigabit Ethernet ), How LAN works, Brief survey of active and passive LAN components.

## **Computer network (5)**

Network, Client and Servers, Host & Terminals, TCP/IP, World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services, Case Study, Intranet.

## **Cyber Laws (3)**

Introduction to Cyber Laws, Cyber crime, Cyber contract, Cyber privacy, IT Act

## **Recommended Books**

1. P .K. Sinha ,Fundamentals of Computers, BPB Publications
2. V. Rajaraman, Fundamentals of Computers, 3rd Edition , PHI Publications.
3. Data and Computer Communications, William Stallings, PHI Publications.
4. Internet working with TCP/IP, Douglas E. Coomer, PHI Publications.
5. An Introduction to Database Systems, 8<sup>th</sup> Edition, C J Date, Pearson.

**Paper Title : Programming Fundamentals (Theory)**

**Paper Code : CS101**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Objective: To get basic knowledge of computers, its components and Operating systems and Linux. Shell Commands.

#### PART A

1. Introduction: (5 hrs)  
Introduction to Programming Languages, Flowcharts, Algorithms, System Software (Assembler, Compiler, Translator, Debugger), Program Structure.
2. Basic Constructs of C: (7 hrs)  
Keywords, Identifiers, Variables, Symbolic Constants, Data Types and their storage, Operands, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, Type Conversions, Precedence and Order of Evaluation, External Variables and Scope of Variables. Basic Input Output, Formatted I/O.
3. Program Control Flow: (7 hrs)  
Statements and Blocks, Conditional Statements, IF, ELSE-IF, Switch Case statements, Control Loops, For, While and Do-While, Go to and Labels.
4. Arrays & Functions: (7hrs)  
Arrays, Multi dimensional arrays, strings, pointer arrays, Functions, Function Prototyping, Scope of functions, Arguments, Call by value and call by references, static variables, recursion.

#### PART B

5. Structures: (6 hrs)  
Structures, Array of Structures, Typedef, Unions, Bit fields, passing structures as an argument to functions, C-Pre-processor and Macros, Command line arguments.
6. Pointers:(6)

Pointer declaration, initialization, Pointer arithmetic, Pointer to array and Pointer to structure.

7. Input and Output (7 hrs)

Standard and Formatted Input and Output, File Access & its types, Line Input and Output, Types of Files, Binary & ASCII Files, Error handling, stderr and exit functions.

Recommended Books:

1. Brian Kernighan and Dennis M. Ritchie: The C Programming Language, Prentice Hall, 2<sup>nd</sup> Edition 2007
2. V.K. Jain : Fundamentals of Information Technology and Computer Programming, PHI. Latest Edition
3. K.N.King : C Programming : A Modern Approach, W.W. Norton Company 2<sup>nd</sup> edition (2008).
4. Herbert Schildt : C: The Complete Reference, Tata Mcgraw Hill Publications 4<sup>th</sup> edition.
5. Yashwant Kanetkar : Let us C++ , latest edition, BPB Publications
6. E. Balagurusamy : Programming in ANSI C++ , TMH publications, 4<sup>th</sup> edition, Reprint (2008).
7. Gottfried : Programming in ANSI C, Schaum Series, TMH publications, 2<sup>nd</sup> Edition (1996).

**Paper Title : Programming Fundamentals Practical**

**Internal Assessment : 50**

Instruction for Students: The candidate will be attending a laboratory session of 2 hours weekly and students have to perform the practical related to the following list.

1. Introduction to basic structure of C program, utility of header and library files.
2. Implementation of program related to the basic constructs in C
3. Program using different data types in C
4. Programs using Loops and Conditional Statements in C
5. Programs using arrays single dimension and multi dimensions in C.
6. Implementation of Matrices and their basic functions such as addition, subtraction, multiplication, inverse.
7. Programs using functions by passing values using call by value and call by reference method
8. Programs related to structures and unions
9. Program to implement array using pointers
10. Programs related to string handling in C
11. Program to manage I/O files and Pointers



## Physics Course 1

Any one of the following three papers to be chosen by institute

**Paper Title : Oscillations And Optics (Theory)**

**Paper Code : APH 101 / APH 201**

**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **PART A**

**Ultrasonics:** Production and detection of ultrasonics (2)

**SHM:** Review of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (3)

**Damped Oscillations:** Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (3)

**Forced Oscillations:** States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver's frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit (4)

**Wave Motion:** Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances (3)

### **PART B**

**Interference:** Division of wave front and amplitude; Fresnel's biprism, Newton's rings, Michelson interferometer and its applications for determination of  $\lambda$  and  $d\lambda$ . (4)

**Diffraction:** Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating. (5)

**Polarization:** Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (4)

**Lasers:** Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (4)

**Fibre Optics:** Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (3)

**Holography:** Basic principle, theory and requirements, applications (2)

#### **References:**

1. Physics for Engineers (Prentice Hall India) - N.K. Verma
2. Physics of Vibrations and Waves (5th Edition, John Wiley & Sons) – H.J.Pain
3. Optics – Ajoy Ghatak

**Paper Title : *Oscillations and Optics Practical***

#### **Internal Assessment: 50**

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel's biprism.
3. (i) To determine the wavelength of He-Ne laser using transmission grating.  
  
(ii) To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.

**Paper Title : Quantum And Statistical Physics (Theory)**

**Paper Code : APH103 / APH203**

**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

## **PART A**

### **SPECIAL THEORY OF RELATIVITY**

Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation (7)

### **ORIGIN AND POSTULATES OF QUANTUM PHYSICS**

Quantum theory of light, X-rays production, spectrum & diffraction (Bragg's law), photoelectric effect, Compton effect, pair production, photons & gravity, black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and applications (7)

Postulates of quantum mechanics, Schrodinger theory, time-dependent and time-independent Schrodinger equation, wave function, Born interpretation and normalization, expectation values (3)

## **PART B**

### **APPLICATIONS OF QUANTUM PHYSICS**

Particle in a box (infinite potential well), finite potential step and barrier problems, tunneling, linear harmonic oscillator (one-dimensional) (4)

Hydrogen atom (qualitative), radiative transitions and selection rules, Zeeman effect, Spin-orbit coupling, electron spin, Stern-Gerlach experiment, exclusion principle, symmetric and antisymmetric wavefunctions (5)

### **STATISTICAL PHYSICS**

Maxwell-Boltzmann statistics, molecular energies in an ideal gas, Bose-Einstein and Fermi-Dirac statistics, black body radiation, Rayleigh-Jeans and Planck's radiation laws, free electrons in a metal, electron-energy distribution, Fermi energy, electronic specific heat, conduction in metals, thermionic emission. (10)

**References:**

1. Concepts of Modern Physics, by Arthur Beiser (McGraw-Hill)
2. Solid State Physics, by C. Kittel (Wiley Eastern)
3. Solid State Physics, by S.O. Pillai (New Age International)
4. Statistical Physics and Thermodynamics by V.S. Bhatia

**Paper Title:** Quantum And Statistical Physics (**Practical**)

**Internal Assessment: 50**

- 1) To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
- 2) To find the value of Planck's constant and evaluate the work function of cathode material by used of photoelectric cell.
- 3) To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
- 4) To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
- 5) To study the Balmer Series of Mercury and Hydrogen spectrum using diffraction grating and calculate Rydberg constant

**Paper Title : Physics of Materials**  
**Paper Code : APH207 / APH107**  
**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **Part - A**

**Crystal structure:** Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids)

Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes)

Structure of polymers, crystallinity of long chain polymers

Crystal Structure analysis, X-ray diffraction and Bragg's law, Powder method for study of X-ray diffraction pattern

Crystal Defects (Point, line, surface and volume imperfections) **(14hrs)**

**Diffusion:** Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors) **(3hrs)**

**Elastic, Anelastic and Viscoelastic Behaviour** Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model **(3hrs)**

### **Part - B**

**Plastic Deformations and strengthening mechanisms :** Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth **(5hrs)**

**Fracture, Fatigue and Creep :** Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack

initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effects.

**(5hrs)**

**Phase Diagrams :** One-Component (or Unary) Phase Diagrams, Binary Isomorphous Systems, Interpretation of Phase Diagrams, Development of Microstructure in Isomorphous Alloys, Mechanical Properties of Isomorphous Alloys, Binary Eutectic Systems, Development of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, The Gibbs Phase - Rule

**(6hrs)**

**Phase Transformations :** Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement

**(4hrs)**

### **References:**

1. Material science and Engineering – An Introduction by William D Callister, Jr, Sixth Edition, John Wiley and Sons.
2. Material science and Engineering – A First Course by V.Raghvan Fourth Edition, Eastern Economy Edition
3. Solid State Physics (New Age Publishers) – S.O. Pillai
4. Introduction to Solids (Tata McGraw Hill, Third Edition) - Leonid V Azaroff

**Paper Title : Physics of Materials (Practical)**

**Internal Assessment : 50**

1. To find the energy band gap of the given semiconductor by four probe method.
2. To study the Hall Effect of a given semiconductor.
3. To determine the dielectric constant of the given materials.
4. To study the B-H curve of the ferromagnetic materials.
5. To determine the value of  $e/m$  for electron by long solenoid (helical) method.
6. To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph.
7. To find the Curie temperature of a Ferroelectric material by measuring Capacitance as a function of temperature.
8. To determine the thermal conductivity of an insulator material using guarded plate method (Lee's disc method).
9. To Study (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) intensity response of photovoltaic cell.

Paper Title : Ethics and Self Awareness

Paper Code : HSS101 / HSS201

Max (Univ. Exam) Marks : 50

Time of examination: 3hrs.

Internal Assessment : 50

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### Lecture Wise Breakup

### No. of Lectures

#### PART A

##### 1. Introduction to Ethics (06)

Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society.

##### 2. Values, Norms, Standards and Morality (04)

Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan

##### 3. Ethics and Business (05)

Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C's of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics

#### PART B

##### 4. Self-Awareness (04)

Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem

##### 5. Self-Development (11)

Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window, Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises

#### BOOKS

1. Murthy, C.S.V., “Business Ethics – Text and Cases”, Himalaya Publishing House

2. Hartman, Laura P. and Chatterjee, Abha, "Business Ethics", Tata McGraw Hill
3. Rao, A.B., "Business Ethics and Professional Values", Excel Books
4. Velasquez, Manuel G., "Business Ethics – Concepts and Cases", Prentice Hall
5. Corey, G., Schneider Corey, M., & Callanan, P., "Issues and Ethics in the Helping Professions", Brooks/Cole.
6. Hall, Calvin S., Lindzey, Dardner. & Cambell, John B., "Theories of Personality", Hamilton Printing Company.
7. Leary, M.R., "The Curse of Self: Self-awareness, Egotism and the Quality of Human Life", Oxford University Press.
8. Twain, Allan, "Self-Awareness"



**Paper Title : Basic Electrical Engineering**

**Paper Code : EE-E101**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Course Duration: 45 lectures of one hour each.**

**Note for the paper setter:** Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 5 conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

#### **PART-A**

**1. DC circuits**

**06**

**hours**

Voltage and current sources, network analysis by mesh and node analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum-power transfer theorem (numerical based on these theorem).

**2. Single Phase AC Fundamentals**

**06 hours**

Alternating current systems, average and RMS values of alternating, quantities, phasor notation, solution and phasor diagram of single phase ac circuits with sinusoidal source excitation.

**3. Three Phase AC Fundamentals**

**06 hours**

Three phase voltages and currents generation, voltages and currents in star and delta connected systems, power in a three phase system, solution of three phase balanced circuits, power and power factor measurement by two watt-meters method.

#### **PART B**

**4. Magnetic Circuit**

**05 hours**

Introduction to magnetic circuit, comparison of electric and magnetic circuits, B/H curve, magnetic circuits calculations, self and mutual inductance.

**5. Transformers**

**06 hours**

Introduction, Basic Principle, EMF equation, losses, efficiency and condition for maximum efficiency, voltage regulation, open circuit and short circuit tests.

**6. Electric Machines**

**07 hours**

Operating principle and application of DC machine and three phase induction motors.

**7. Electrical Generation and Transmission**

**06 hours**

Introduction to Resources of Electrical Power, Conventional and Non-Conventional, AC transmission voltage levels, Single Line Diagram of Power transmission network. Distribution network and Single Line Diagram of Distribution Network.

**Recommended Books:**

1. Edward Hughes: Electrical & Electronic Technology, Pearson Education Publication Asia, 2003.
2. T.K. Nagsarkar and M.S. Sukhija, : Basic Electrical Engineering, OXFORD University Press, 2004.
3. Fitzgerald, Higginbotham, & Gabriel: Basic Electrical Engineering, , McGraw Hill, 4th edition.
4. Del Toro , Principles of Electrical Engineering , PHI, New-Delhi, 2nd edition.
5. I.J.Nagrath and D.P. Kothari : Basic Electrical Engineering TMH, New Delhi, 3rd edition.
6. S. K. Bhattacharya and K. M. Rastogi : Experiments in Basic Electrical Engineering, New Age International Publishers Ltd., New Delhi.

**Basic Electrical Engineering Practical**

**Time of examination: 2hrs.**

**Instruction for Students:** Note: Perform at least eight experiments.

1. Measure resistance and inductive reactance of a choke coil make a series RLC circuit using the choke coil and obtain its phasor diagram.
2. To prove Superposition and Maximum Power Transfer theorem.
3. To prove Thevenin's and Norton's theorem.
4. Study the resonance in an RLC series and parallel circuits.
5. To find out the relationship between line current & phase current, between line voltage & phase voltage for star and delta connected loads supplied from balanced three phase supply.
6. To measure power and power factor using wattmeter in single phase circuit.
7. Perform Open circuit and short circuit tests on a single phase transformer to draw equivalent circuit.
8. To connect, start and reverse the direction of a 3 Phase Induction Motor and measure speed / torque.
9. Study and demonstration of earthing system for protection against shocks.
10. To measure power and power factor using two wattmeter of three phase load.

## **SEMESTER II**

**Paper Title : Differential Equations and Transforms**

**Paper Code : MATHS201**

**Pre Requisite : Calculus (MATHS101)**

**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **Objectives**

- To learn the methods to formulate and solve linear differential equations and their applications to engineering problems
- To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform
- To apply Laplace transforms to solve ordinary differential equations
- To learn the concept of Fourier series, integrals and transforms.
- To learn how to solve heat, wave and Laplace equations.

<b>S. No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
	<b>PART A</b>	
<b>1.</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS</b> Review of geometrical meaning of the differential equation $y' = f(x, y)$ , directional fields, Exact differential equations (Scope as in Chapter 8, Section 8.7 of Reference 5), Integrating factors (Scope as in Chapter 8, Section 8.8 of Reference 5), Solution of differential equations with constant coefficients: method of differential operators. Non – homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters (Scope as in Chapter 9, Section 9.7 of Reference 5). Power series method of solution (Scope as in Chapter 10, Section 10.2 of Reference 2)	<b>13</b>

<b>2.</b>	<b>Laplace Transforms</b> Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac's Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions (Scope as in Chapter 5, Sections 5.1 – 5.5 of Reference 1).	<b>10</b>
	<b>PART B</b>	
<b>3.</b>	<b>Fourier Series and Transforms:</b> Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 10, Sections 10.1 – 10.5, 10.7 – 10.10 of Reference 1).	<b>8</b>
<b>4.</b>	<b>Partial Differential Equations:</b> Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve (Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 4).	<b>6</b>
<b>5.</b>	<b>Boundary Value Problems:</b> D'Alembert's solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation, Laplace equation in Cartesian and Polar coordinates (Scope as in Chapter 11, Sections 11.1, 11.3 – 11.5, 11.8 – 11.9 of Reference 1).	<b>8</b>

### **Outcomes**

1. The student will learn to solve Ordinary Differential equations.
2. The students will be able to apply the tools of Laplace Transforms to model engineering problems and solve the resulting differential equations.
3. Students will understand the nature and behavior of trigonometric (Fourier) series and apply it to solve boundary value problems.

### **References:**

1. E. Kreyszig. Advanced Engineering Mathematics, Eighth Edition, John Wiley.
2. B. V. Ramana. Higher Engineering Mathematics, Tata McGraw Hill.

3. R. K. Jain, S. R. K. Iyenger. Advanced Engineering Mathematics, Narosa Publications.
4. Ian N. Sneedon. Elements of Partial Differential Equations, McGraw-Hill, Singapore, 1957.
5. Michael D. Greenberg. Advanced Engineering Mathematics, Second Edition, Pearson Education.
6. Advanced Engineering Mathematics, Wylie and Barrett, McGraw Hill
7. Frank Ayers. Theory and Problems of Differential Equations, Shaum Outline Series, McGraw-Hill, Singapore, 1972.

**Paper Title : Communication Skills**

**Paper Code : HSS202 / HSS102**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **Part –A**

<b>Lecture Wise Breakup</b>	<b>No. of Lectures</b>
<b>1. Fundamentals of Communication Skills</b>	<b>(02)</b>
Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing	
<b>2. Writing Skills</b>	<b>(04)</b>
Basics of Grammar – Word Order, Sentence Construction, Placing of Subject and Verbs, Parts of Speech, Use of Tenses, Articles, Prepositions, Phrasal Verbs, Active-Passive, Narration	
<b>3. Vocabulary Building and Writing</b>	<b>(03)</b>
Word Formations, Synonyms, Antonyms, Homonyms, One-Word Substitutes, Idioms and Phrases, Abbreviations of Scientific and Technical Words	
<b>4. Speaking Skills</b>	<b>(03)</b>
Introduction to Phonetic Sounds, English Phonemes, Stress, Rhythm and Intonation, Countering Stage Fright and Barriers of Communication	
<b>5. Reading and Comprehension</b>	<b>(02)</b>

### **Part –B**

<b>Lecture Wise Breakup</b>	<b>No. of Lectures</b>
<b>1. Advanced Communication Skills</b>	<b>(02)</b>
Scope, Significance, Process of Communication in an organization, Types and Levels, Communication Networks, Technical Communication, Tools of Effective Communication	
<b>2. Speaking Skills and Personality Development</b>	<b>(05)</b>
Interpersonal Communication, Presentation Skills, Body Language and Voice Modulation, Persuasion, Negotiation and Linguistic Programming, Public Speaking, Group Discussions, Interviews and Case Studies, Power Point Presentations , Relevant to the context and locale, Technical Presentations,	

- Conducting , Meeting and Conferences
- 3. Communication and Media (01)**  
Social and Political Context of Communication, Recent Developments in Media
- 4. Advanced Techniques in Speaking Skills (02)**  
Importance of Listening/Responding to native and global accents, Telephonic Interviews and Video Conferencing
- 5. Advanced Techniques in Technical Writing (04)**  
Job Application, CV Writing, Business Letters, Memos, Minutes, Reports and Report Writing Strategies, E-mail Etiquette, Blog Writing, Instruction Manuals and Technical Proposals

### **Practical Sessions**

1. Individual presentations with stress on delivery and content
2. Overcoming Stage Fright - Debates, extempore
3. How to discuss in a group - Group Discussion
4. Discussion on recent developments and current debates in the media
5. How to prepare for an Interview and face it with confidence
6. Conducting meeting and conferences
7. Exercises on Composition & Comprehension, Reading Improvement

### **TEXT BOOKS**

1. Ludlow, R. and Panton, F., "The Essence of Effective Communication", Prentice Hall
2. Quirk, Randolph. and Sidney, Greenbaum., "A University Grammar of English", Pearson Education
3. Ashraf, M. Rizvi, "Effective Technical Communication", McGraw Hill
4. Bovee, Courtland L. and John, V. Thill., "Business Communication Today", Pearson Education

### **REFERENCE BOOKS**

1. Guffrey, Mary E., "Essentials of Business Communication", South-Western College Publishing
2. Raman, Minakshi. And Sharma, S., "Technical Communication: Principles and Practice", Oxford University Press
3. Rodrigues, M.V., "Effective Communication", Himalaya Publishing House
4. McCarthy, Michael. and Felicity O' Dell., "English Vocabulary in Use", Cambridge University Press
5. Jones, Daniel., "The Pronunciation of English", Universal Book Stall

6. Sharma, R.C. and Mohan, K., “Business Correspondence and Report Writing”, Tata McGraw Hill
7. Raman, Minakshi. And Sharma, S., “Technical Communication: Principles and Practice”, Oxford University Press
8. Scott, Bill., “Communication for Professional Engineers”, Thomas Teleford Ltd.
9. McMurrey, David A. and Joanne, Buckley., “Handbook for Technical Writing”, Cengage Learning
10. Harve, L., Locke, W. and Morey, A., “Enhancing Employability and Recognizing Diversity”, Universities UK and CSU
11. Lock, R., “Student Activities for taking charge of your Career Direction and Job Search”, Cole Publishing
12. Pease, A., “Body Language”, Sheldon Press



## Physics Course 2

Any one of the following three papers to be chosen by institute

**Paper Title : Oscillations And Optics (Theory)**

**Paper Code : APH 101 / APH 201**

**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **PART A**

**Ultrasonics:** Production and detection of ultrasonics (2)

**SHM:** Review of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (3)

**Damped Oscillations:** Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (3)

**Forced Oscillations:** States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver's frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit (4)

**Wave Motion:** Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances (3)

### **PART B**

**Interference:** Division of wave front and amplitude; Fresnel's biprism, Newton's rings, Michelson interferometer and its applications for determination of  $\lambda$  and  $d\lambda$ . (4)

**Diffraction:** Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating. (5)

**Polarization:** Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (4)

**Lasers:** Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (4)

**Fibre Optics:** Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (3)

**Holography:** Basic principle, theory and requirements, applications (2)

#### **References:**

1. Physics for Engineers (Prentice Hall India) - N.K. Verma
2. Physics of Vibrations and Waves (5th Edition, John Wiley & Sons) – H.J.Pain
3. Optics – Ajoy Ghatak

**Paper Title : *Oscillations and Optics Practical***

#### **Internal Assessment: 50**

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel's biprism.
3. (i) To determine the wavelength of He-Ne laser using transmission grating.  
  
(ii) To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.

**Paper Title : Quantum And Statistical Physics (Theory)**

**Paper Code : APH103 / APH203**

**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

## **PART A**

### **SPECIAL THEORY OF RELATIVITY**

Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation (7)

### **ORIGIN AND POSTULATES OF QUANTUM PHYSICS**

Quantum theory of light, X-rays production, spectrum & diffraction (Bragg's law), photoelectric effect, Compton effect, pair production, photons & gravity, black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and applications (7)

Postulates of quantum mechanics, Schrodinger theory, time-dependent and time-independent Schrodinger equation, wave function, Born interpretation and normalization, expectation values (3)

## **PART B**

### **APPLICATIONS OF QUANTUM PHYSICS**

Particle in a box (infinite potential well), finite potential step and barrier problems, tunneling, linear harmonic oscillator (one-dimensional) (4)

Hydrogen atom (qualitative), radiative transitions and selection rules, Zeeman effect, Spin-orbit coupling, electron spin, Stern-Gerlach experiment, exclusion principle, symmetric and antisymmetric wavefunctions (5)

### **STATISTICAL PHYSICS**

Maxwell-Boltzmann statistics, molecular energies in an ideal gas, Bose-Einstein and Fermi-Dirac statistics, black body radiation, Rayleigh-Jeans and Planck's radiation laws, free electrons in a metal, electron-energy distribution, Fermi energy, electronic specific heat, conduction in metals, thermionic emission. (10)

**References:**

1. Concepts of Modern Physics, by Arthur Beiser (McGraw-Hill)
2. Solid State Physics, by C. Kittel (Wiley Eastern)
3. Solid State Physics, by S.O. Pillai (New Age International)
4. Statistical Physics and Thermodynamics by V.S. Bhatia

**Paper Title:** Quantum And Statistical Physics (**Practical**)

**Internal Assessment: 50**

- 1) To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
- 2) To find the value of Planck's constant and evaluate the work function of cathode material by used of photoelectric cell.
- 3) To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
- 4) To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
- 5) To study the Balmer Series of Mercury and Hydrogen spectrum using diffraction grating and calculate Rydberg constant

**Paper Title : Physics of Materials**  
**Paper Code : APH207 / APH107**  
**Course Duration: 45 lectures of one hour each.**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **Part - A**

**Crystal structure:** Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids)

Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes)

Structure of polymers, crystallinity of long chain polymers

Crystal Structure analysis, X-ray diffraction and Bragg's law, Powder method for study of X-ray diffraction pattern

Crystal Defects (Point, line, surface and volume imperfections) **(14hrs)**

**Diffusion:** Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors) **(3hrs)**

**Elastic, Anelastic and Viscoelastic Behaviour** Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model **(3hrs)**

### **Part - B**

**Plastic Deformations and strengthening mechanisms :** Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth **(5hrs)**

**Fracture, Fatigue and Creep :** Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack

initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effects.

**(5hrs)**

**Phase Diagrams :** One-Component (or Unary) Phase Diagrams, Binary Isomorphous Systems, Interpretation of Phase Diagrams, Development of Microstructure in Isomorphous Alloys, Mechanical Properties of Isomorphous Alloys, Binary Eutectic Systems, Development of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, The Gibbs Phase - Rule

**(6hrs)**

**Phase Transformations :** Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement

**(4hrs)**

### **References:**

1. Material science and Engineering – An Introduction by William D Callister, Jr, Sixth Edition, John Wiley and Sons.
2. Material science and Engineering – A First Course by V.Raghvan Fourth Edition, Eastern Economy Edition
3. Solid State Physics (New Age Publishers) – S.O. Pillai
4. Introduction to Solids (Tata McGraw Hill, Third Edition) - Leonid V Azaroff

**Paper Title : Physics of Materials (Practical)**

**Internal Assessment : 50**

1. To find the energy band gap of the given semiconductor by four probe method.
2. To study the Hall Effect of a given semiconductor.
3. To determine the dielectric constant of the given materials.
4. To study the B-H curve of the ferromagnetic materials.
5. To determine the value of  $e/m$  for electron by long solenoid (helical) method.
6. To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph.
7. To find the Curie temperature of a Ferroelectric material by measuring Capacitance as a function of temperature.
8. To determine the thermal conductivity of an insulator material using guarded plate method (Lee's disc method).
9. To Study (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) intensity response of photovoltaic cell.

**Paper Title: Workshop Practice**

**Paper Code: ME 203 / ME103**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Course Prerequisites: Basic Workshop Practices**

**Course  
Objective  
s(CO) :**

**Student will be able to:**

- 1. Know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals.**
- 2. Understand different Mechanisms, Use of Machines, Tools and Equipment.**
- 3. Knowledge of basic Manufacturing Processes in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops.**

**Course  
Outcome  
:**

**This course is designed to help students achieve the following outcomes.**

- 1) Familiarity with common machines, Tools and Equipment in basic Workshop Practices.**
- 2) On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions.**
- 3) Applications of Basic Workshop Practices..**

**SYLLABUS**

**8u98**

**Instruction for Students: The candidate will be attending a laboratory session of three hours weekly.**

**Practice of basic exercises related with different shops. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions.**

**Welding Workshop : (Theory)Joining Processes, Welding and its Classification, Welding Processes, Fusion Welding, Pressure Welding, Electric Arc Welding, Gas Welding, Resistance Welding, Metal Inert gas Welding, Welding Joints, Welding Positions, Welding defects, Welding Applications, Basic welding design and Procedures, identification of materials,**

**Jobs: Butt Joint in Flat Position using SMAW.**

**Lap Joint using Spot Welding**

**Edge Joint in Horizontal Position using SMAW**

**Tee Joint in Flat position using SMAW**

**Corner Joint in vertical position using SMAW.**

**Defect Identification and marking.**

**Edge preparation and Fillet making, Tacking, Distortion identification**

**Electronics Workshop :** To know about Soldering mechanism and techniques  
 Familiarity with Electronic Components / symbols  
 Testing of electronic components  
 Application of Soldering : Circuit Assembly  
 List of Jobs :  
 Practice of Soldering and de-soldering  
 Identification and testing of a) passive electronic components b) Active electronic components  
 Assembly of Regulated Power supply circuit

**Electrical Workshop:**  
 Introduction of Various Electric wirings, Wiring Systems, Electrical wiring material and fitting, different type of cables, Conduit pipe and its fitting, inspection points, switches of all types, Distribution boards, M.C.B's etc.  
 Electric Shock and its management.  
 Electric Tools: Conversance with various tools and to carry out the following:  
 a) Measurement of wire sizes using SWG and micrometer  
 b) Identification of Phase and neutral in single phase supply

**Jobs:**  
 To control a lamp with a single way switch  
 To control a lamp from two different places  
 To assemble a fluorescent lamp with its accessories  
 To control a lamp, fan and a three pin socket in parallel connection with single way switches

**Fitting Shop:**  
 Introduction of Fitting, different type of operations, Tools, materials, precision instruments like Vernier caliper and Micrometer etc,  
 Safety precautions and Practical demonstration of tools and equipments

**Jobs:** To make a square from MS Flat, Punching, Cutting, Filling techniques and practice, Tapping, Counter Drilling

**Smithy Workshop:**  
 Introduction of Smithy and Forging process, Tools and Equipment's, Operations, Heat Treatment processes, Advantages, Dis-advantages, Defects and Safety precautions.  
**Jobs:** Drawing and Upsetting Practice using Open Hearth Furnace.  
 Cold working process practice  
 Heat Treatment \: Annealing and hardening process

**Machine Shop :** Application, Function and different parts, Operations of Lathe, Type of Cutting Tools and their materials, Drill machine Types, applications and Functions. Hacksaw machines and functions, Work Holding devices and tools, chucks, Vices, machine Vices, V Block, Measuring Instruments uses, Shaper and Milling machine Applications.  
**Jobs:** To perform Marking, Facing, Turning, taper Turning, Grooving, Knurling, parting, Drilling, Reaming operations on lathe machine,  
 Hacksawing practice on Power hacksaw,  
 Shaping operation practice on Shaper



**Carpentry Shop: Classification of Tree, Timber. Advantages and uses of Timber, Seasoning of Wood, Tools Used, Defects and Prevention of Wood,**

**Jobs:**

**Tee Joint**

**Cross Joint**

**Tenon Joint,**

**L Shape Joint**

**Practice of Wood Working Lathe**

**Practice on multi-purpose Planer**

**Foundry Shop : Introduction to Foundry, Advantages and Disadvantages of castings process, Introduction to pattern and various hand tools, Ingredients of Green sands, Various Hand Molding processes, Introduction to Casting Defects,**

**Jobs: Identification and uses of hand tools, Preparation of Green sand in Muller, Preparation of Sand Mould of Single piece solid pattern, Split pattern, Preparation of Green sand Core, casting of a Mould and study its defects.**

#### **RECOMMENDED BOOKS**

	<b>NAME</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
<b>1.</b>	<b>Introduction to Basic Manufacturing Processes and Workshop Technology</b>	<b>Rajender Singh</b>	<b>New Age International Publication</b>
<b>2</b>	<b>Manufacturing Processes</b>	<b>Chapman</b>	<b>Viva Books Private Limited</b>

**Paper Title : Introduction to Environment Science**

**Paper Code : GS101 / GS 201**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

### **PART A**

#### **General (04)**

Introduction, components of the environment, environmental degradation.

#### **Ecology (04)**

Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

#### **Air pollution and control (06)**

Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

### **PART B**

#### **Water pollution and control (06)**

Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.

#### **Land Pollution (06)**

Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

#### **Noise Pollution (04)**

Sources, effects, standards and control.

## **Books & References**

- Masters, C.M., "Introduction to Environmental Engineering and Science", Prentice Hall of India Pvt. Ltd., 1991.
- Nebel, B.J., "Environmental Science" Prentice –Hall Inc., 1987.

**Paper Title : INTRODUCTION TO ELECTRONICS**

**Paper Code : EC202 / EC102**

**Max (Univ. Exam) Marks : 50**

**Time of examination: 3hrs.**

**Internal Assessment : 50**

**Course Duration: 45 lectures of one hour each.**

**Note for the examiner:** The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

**Course Objectives:**

1. To introduce the field of electronics along with the applications.
2. To understand the fundamental concepts of basic semiconductor devices and digital electronics.
3. To become familiar with basic principle of operational amplifier along with its applications.
4. To make students familiar with the basic concept of Communication System.

**Lecture wise breakup  
of Lectures**

**No.**

**Part A**

**Introduction to Electronics:** Evolution of Electronic Devices and Integrated Circuit, Applications of electronics, Need and application of electronics in different areas

**(4)**

**Semiconductor Devices:** Concept of active and passive devices, Intrinsic and Extrinsic Semiconductors, conductivity of semiconductors and its temperature dependence, Semiconductor Devices: Structure, principle of operation, characteristics and applications of PN-Junction (Rectifier, Clipper and Clamper), BJT, Current Components in BJT, Input & Output characteristics Common Emitter (CE), Common Base (CB), Common Collector (CC) configurations.

**(12)**

**Digital Electronics I:** Number System and conversion, Binary arithmetic, basic and universal logic gates, minimization of Boolean expression using Boolean Algebra and K map.

**(4)**

**Part B**

**Digital Electronics II:** Concept of flip-flops, RS, D, JK and T types, basic operation of counters and registers, introduction to RAM & ROM, Basic principle and characteristics of Analog to Digital Converters (ADCs) and Digital to Analog Converters (DACs), types of DACs and ADCs.

**(8)**

**Operational Amplifier and its applications:** Block diagram, characteristics, inverting and non-inverting configurations, Op-amp as summing amplifier, difference amplifier, integrator and differentiator

**(8)**

**Communication Systems:** Various frequency bands used for communication, Block diagram of Analog and Digital communication, need of modulation, comparison of Analog and Digital communication systems.

**(6) Recommended Books:**

1. Integrated Electronics, Millman & Halkias (Mc-Graw Hill)
2. Electronics Devices & Circuit Theory, RL Boylestead & L Nashelsky (PHI)
3. Modern Digital Electronics, R P Jain, Tata McGraw Hill.
4. Electronic Communication Systems, G. Kennedy, McGraw Hill, 4th Edition

**Course Name : INTRODUCTION TO ELECTRONICS (Practical)**

**List of Experiments:**

1. Familiarization with electronic components and usage of Multimeter
2. Familiarization with CRO and Signal Generator.
3. To study the V-I characteristics of pn junction diode and determine static resistance and dynamic resistance.
4. To implement clipper and clamper circuits.
5. To plot the characteristics of BJT configurations.
6. To verify Truth Table of different logic gates.
7. To verify Truth Table of different logic gates flip-flops.
8. To study Op-amp as summing amplifier.
9. To study Op-amp difference amplifier.
10. To study Op-amp integrator and differentiator.