

SIR PADAMPAT SINGHANIA UNIVERSITY
Udaipur

School of Engineering
Department of Electronics & Communication Engineering

Semester-II					
Code	Name of the Subject	L	T	P	Total Credits
HU 102	English & Professional Communication-II	2	1	0	3
PH 103	Physics of Materials	3	0	1	4
MA 103	Advanced Engg. Mathematics-I	3	1	0	4
EC 102	Electronic Devices & Circuits-I	3	1	1	5
CS 102	Object Oriented Programming	3	0	1	4
ME 101	Engg. Graphics and AutoCAD	0	0	2	2
CH 103	Environmental Sciences	3	0	0	3
	Total				25

HU 102 ENGLISH AND PROFESSIONAL COMMUNICATION-II

L-T-P-C

2- 1-0-3

Objective: The course is designed to train students in the art of communication through language exercises of both general and technical varieties.

Course Outline:

Perspectives on Academic Writing and Research

In this global era, effective comprehension is an attempt to develop in technocrats an ability to comprehend different topics related to varied scientific and social happenings in the world.

- Letter Writing: Business Letters, Informal Letters.
- Précis Writing
- Report- Technical, Non-technical and Lab report.

Developing Interpersonal Skills

Interpersonal Skills include the ability to read and manage the emotions, motivations and behaviors of one and others during social interactions. It focuses on developing the student's ability to master the art of presentation.

- Group Discussions, Study Skills, Language Focus, Speaking.
- Effective Presentations, Importance of Body Language in Presentation, Podium panic.
- Listening Skills, Note Taking and Preparation of minutes.

Resume writing and Revision of Grammar

- Resume Checklist, Types of resumes, Cover letter, Acceptance Letter, Rejection letter and Resignation letter
- Revision of Tenses, Conditionals, Direct and Indirect Speech, Basic Sentence Patterns, Active and Passive Voice

Recommended Reading:

1. Krishna Mohan and Meera Banerjee. Developing Communication Skills. Macmillan India Ltd.
2. Kahn, John, Ellison ed. How to Write and Speak Better. The Reader's Digest Association Ltd, London.
3. Radhakrishnan Pillai, etal. Written English for you. Emerald Publishers, Chennai.

Coffey M.P. Communication through Writing: Prentice Hall Publishers.

PH 103 PHYSICS OF MATERIALS

L-T-P-C
3-0-1-4

Objective: *This is an introductory course on quantum mechanics and its applications to help in understanding the electrical, thermal and magnetic properties of metals, band theory of solids, superconductivity and classification of solids into metals, semiconductors and insulators*

Black body radiation, Planck's radiation law, Compton effect, Nature of waves & particles, Wave-packets and uncertainty, Wave particle duality, Wave mechanics and its mathematical tools, Particle in a quantum well, Tunneling of particles and Examples.

Review shortcomings of Bohr model, Hydrogen atom problems, angular momentum quantization, space quantization, normal Zeeman effect, electron spin.

Theory of Relativity: Inertial and non inertial frame of references, Galilean and Lorentz transformations, relativity of length, time, velocity, mass and energy.

Laser action and properties of laser radiation, common laser systems: Ruby laser, He-Ne laser, semiconductor laser, Basics and applications of holography.

Conduction in metals, Mobility and conductivity, Classical free electron theory of metals, Electrical conductivity, Thermal conductivity, Wiedmann Franz law, Lorentz number, Drawbacks of classical theory, Statistical distributions – classical and quantum statistics, Fermi distribution function, Effect of temperature on Fermi function, Density of energy states, electron in a periodic potential, Kronig-Penney model, Effective mass, origin of the energy gap, energy bands in solids, classification of solids into metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, carrier transport phenomena, carrier drift, carrier diffusion, Hall effect.

Application to semiconductor doping, Basic structure of the p-n junction, The potential barrier at the p-n junction, width of depletion layer of the p-n junction, volt-ampere characteristics of the p-n junction, tunnel diode, photodiode, LED.

Superconductivity, Type I and II superconductors, Meissner effect, Applications of superconductors.

Engineering materials: conducting, dielectric, magnetic and semiconducting materials

Recommended reading:

1. A. Beiser, Concepts of Modern Physics, 5th ed., McGraw-Hill
2. K.S. Krane, Modern Physics, 2nd ed., Wiley.
3. J. Taylor, C. Zafiratos, M. A. Dubson, Modern Physics for Scientists and Engineers, 2/E, Prentice Hall.
4. C. Kittel, Introduction to Solid State Physics, 7th ed., Wiley India Pvt. Ltd.
5. S. O. Pillai, Solid State Physics, 6th ed., New Age International Publishers Ltd.
6. J. P. Srivastava, Elements of Solid State Physics, 2nd ed., Prentice-Hall.
7. G. Aruldas and P. Rajagopal, Modern Physics, PHI.
8. D. Neamen, Semiconductor physics and devices, McGraw Hill.

MA-103 ADVANCED ENGINEERING MATHEMATICS-I

L-T-P-C

3- 1- 0- 4

Objective: Students will develop an understanding of the fundamental concepts of the calculus, and differential equations connect them with real world problems from other disciplines. Students would also develop mathematical reasoning and problem-solving abilities

Vector Calculus: Scalar and Vector fields; Gradient, divergence, curl, Laplacian; Directional Derivative; Differentiation and Integration of Vector functions; Line integrals, Surface integrals. Applications of Green's theorem, Divergence theorem, Stokes' theorem.

Laplace Transform: Existence of Laplace Transform; Laplace Transform of elementary functions; First and second shifting properties; Change of scale property; Laplace Transform of derivatives. Laplace Transform of periodic functions; Laplace Transform of $(t^n f(t))$, Laplace Transform of $(f(t) / t)$; Laplace Transform of special functions; Convolution theorem. Inverse Laplace transform; Application of Laplace transforms in solving ordinary differential equations.

Fourier series: Euler's formula; Problems on general Fourier Series; Conditions for Fourier Expansion; Fourier Expansions of Discontinuous Functions; Even and Odd functions; Change of interval; Half range series; Typical Waveforms (Square, Saw-toothed, Triangular, Half Wave rectifier, Full Wave rectifier); Parseval's Identity; Harmonic analysis.

Fourier Transforms: Fourier Transform and its properties; Fourier sine and cosine transforms, Fourier integral formula ; Inverse Fourier Transform; Fourier transform of derivatives; Convolution; Application of Fourier Transform in solving partial differential equations — Laplace's Equation (2D only), Heat Conduction Equation (1D only) and Wave Equation (1D only).

Z- transforms: Properties of Z -transform, Initial Value theorem, Final Value Theorem; Inverse Z- transform, Z- transform of some important sequences; Solution of Difference Equations using Z- transform.

Differential Equations: Second order ordinary differential equations with variable coefficients: Homogeneous and Exact equations; Solution by change of dependent and independent variable; Method of Variation of Parameters. Series solution of second order ordinary differential equations with variable coefficients. Partial Differential Equations of First Order; Lagrange's equation, Standard forms; Charpit's Method.

References:

- 1 Kreszig E
- 2 Grewal B S
- 3 Dass H K

Advanced Engineering Mathematics.
Higher Engineering Mathematics
Advanced Engineering Mathematics.

EC102 ELECTRONIC DEVICES AND CIRCUITS-I

L-T-P-C

3- 1- 1-5

Objective: This course introduces students to electronic devices such as diodes, bipolar transistors, field effect transistors and their use in basic circuits.

Semiconductor Diodes: Band structure of p-n junction, current components, Quantitative theory of P-N diode, Volt-ampere characteristics and its temperature dependence Narrow-base diode, Transition and diffusion capacitance of P-N junction diodes. Break down of junctions on reverse bias, Zener and Avalanche breakdowns, Tunnel diode and its V-I characteristics, Use of diodes in rectification circuits, Clipping and clamping circuits.

Junction Transistor: PNP and NPN junction transistors, Characteristics of the current flow across the base regions, Minority and majority carrier profiles. Transistor as a device in CB, CE and CC configurations and their characteristics, transistor biasing: DC bias and stabilization, various stabilization circuits, Thermal runaway and thermal stability.

Field Effect Transistors: JFET and its characteristics. Pinch off voltage and drain saturation current. MOSFET- enhancement, depletion modes, Biasing of FETs.

Negative Resistance Switching Circuits: Voltage controlled, Current controlled negative resistance circuits, its application to switching (using tunnel diode and UJT).

Small Signal Low Frequency Transistor Amplifier Circuits: Transistor hybrid model, analysis of transistor amplifier circuits using 'h' parameters, Conversion formula for the parameters of the three configurations, Analysis of single stage transistor amplifier circuits. RC coupled amplifier, effect of bypass and coupling capacitors on the low frequency response of the amplifier, Emitter follower amplifier. Cascaded amplifiers, Low frequency model of FET-Common Source & Common Drain Amplifier, frequency response of amplifier circuits, Analysis of single and multistage amplifier circuits.

Power Amplifier: Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Recommended Books:

1. Semiconductor Device Fundamental by Robert F. Pierret, PHI
2. Electronics Devices and Circuits by Boylested, Pearson Education
3. Electronics devices and Circuits by Millman & Halkias, Mc Graw-Hill
4. Electronic Devices and Circuits by Y.N Bapat,, Tata Mc-Graw Hill, New Delhi.
5. Pulse Digital and Switching waveforms, Millman and Taub, Tata McGraw Hill.

CS102 OBJECT ORIENTED PROGRAMMING

L T P C

3-0-1-4

Objective: *This course examines practical programming techniques and issues, emphasizing object modeling and simulation. Issues involved in developing large-scale object-oriented systems and fundamental techniques used to simplify software development are also discussed. The course provides in depth information on object oriented programming, techniques, and methodologies.*

Review: Review of basic concepts of object-oriented programming, comparison between procedural programming paradigm and object-oriented programming paradigm.

Classes & Objects: specifying a class, creating class objects, accessing class members, access specifiers: public, private, and protected, classes, objects and memory, static members, the const keyword and classes, the static objects, empty classes, nested classes, local classes, abstract classes.

Console Based I/O: concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and memory functions of i/o stream classes, formatting output, formatting using ios class functions and flags, formatting using manipulators.

Constructors & Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, destructors, constructors and destructors with static members, initializer lists.

Operator Overloading & Type Conversion: Defining operator overloading, rules for overloading operators, overloading of unary operators and various binary operators, overloading of new and delete operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multi-path inheritance, virtual base class, overriding member functions, order of execution of constructors and destructors.

Pointers & Dynamic Memory Management: understanding pointers, accessing address of a variable, declaring & initializing pointers, accessing a variable through its pointer, pointer arithmetic, pointer to a pointer, pointer to a function, dynamic memory management - new and delete operators, pointers and classes, pointer to an object, pointer to a member, this pointer, self referential classes, possible problems with the use of pointers - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

Virtual functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, virtual destructors & polymorphism.

Managing Data Files: File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files, data formatting in memory buffers.

Exception handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions.

Books:

1. Robert Lafore, Object-Oriented Programming in C++, The Waite groups, galgotia publications Pvt. Ltd.
2. Bruce Eckel, Thinking in C++, 2nd Ed., Wall 1, Wall 2.
3. Danny Kalev, The ANSI/ISO C++ Professional programmers Handbook, PHI 2000.
4. Deital & Deital, C++ How to Programme, Prentice Hall 5th Ed.
5. John R. Hubbart, Programming with C++, Schaum's Outline Series 2nd Ed.

ME101/ME205 ENGINEERING GRAPHICS AND AUTO CAD

L T P C

0- 0-2-2

Objective: This course introduces the students to engineering graphics and its applications, primarily using the AutoCAD software.

Importance of Engineering Drawing: Geometrical Drawing-Plane and solid Geometry. Engineering Drawing Instruments and their use., BIS conventions for layout of sheets, borderlines, title block, lines, lettering.

Autocad : Object selection Methods-Erase, Undo, Zoom, Hatch. Types of Modelling –ViewPoint, viewports, cylinder, cone, box, union, subtract, massproperty, sectional view, Isometric Drawing-Basic dimensioning, polyline, offset, thickness, elevation, changeprop, extrusion, plot and exit, Creating 2d drawings and 3d objects and related problems. *(To be covered in practical class)*

Projection: Isometric Projection, Oblique Projection

Solid Geometry: Orthographic Projection, Projection of points, projection of straight lines, projection of planes.

Projection of Solids: Prisms, cylinder, axis perpendicular to one plane and parallel to the other, axis parallel to both the planes, axis inclined to both H.P. and V.P. Auxiliary Projection of solids: types of auxiliary planes, projection of a point on A.V.P. inclined to V.P. axis inclined to both H.P. and V.P.

Section of Solids: Sectional views: sectional plane perpendicular to H.P. and Parallel to V.P. and vice versa, true shape sections.

Development of Surfaces: Radial line method, Parallel line method

Reference Books:

1. Engineering drawing by N.D. Bhatt
2. An Introduction to Engineering Drawing by Luzzader
3. Auto Cad 2002 by Duff
4. Engineering Drawing by Gill

CH 103 ENVIRONMENTAL SCIENCES

L T P C
3- 0-0-3

Objective: This paper introduces the students to the basics of Environmental science. Major issues like renewable and non renewable sources of energy, pollution problems and social impact of the environment are discussed from a scientific perspective. This course also provides an insight on management of natural resources, deals with the impact of environmental pollution on health and includes the guidelines for pollution control in the context of public health. Global issues like acid rain, ozone depletion, climate changes and population explosion are also discussed.

Natural Resources: Multidisciplinary nature of environmental studies Natural resources: renewable, non renewable resources, natural resources, associated problems, forest resources, water resources, mineral resources, food resources, energy resources, land resources

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following

Ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: definition, magnitude of diversity, levels of biodiversity (genetic, species, community and ecosystems), gradients, values, threats of biodiversity, bio-geographical classification of India and world IUCN red data book, status of threatened species, conservation of biology and biodiversity, hotspots of biodiversity, role of an individual in conservation of natural resources, equitable uses of resources for sustainable life style, International efforts for conservation of biodiversity, biodiversity conservation in India

Environmental Pollution: Definition, Cause, Effects and Control Measures of:

Air Pollution- Introduction, classification of air pollutants, Characteristics and biochemical effects of some air pollutants, effects of air pollutants on man and the environment, air monitoring, atmospheric sampling, analytical and instrumental techniques used in the estimation of atmospheric pollutant and methods used for the control of air pollutants.

Water Pollution- Introduction, classification of water pollutant, organic waste, sewage and agricultural run off, inorganic pollutant, suspended solids, water

quality standards, Sources, characteristics and effects of water pollutant from textile industry, paper and pulp industry, fertilizer industry, soaps and detergents.

Radioactive Pollution and Thermal pollution - Introduction, Sources of thermal pollution, fundamentals of radiations, types of radiations, sources of radioactive pollution and effects of radioactive pollution (somatic and genetic effects)

Chemical Pollution- Chemical pollution through fertilizers, pesticides, detergents and toxic metals in industrial waste Hg, Cd, Pb, Cr, Zn, Cu, As, Ni, Se, Sn, Sb, F, Be etc.

Marine Pollution- Introduction, nature and effects of marine pollution, sources of marine pollution and control of marine pollution, Marine pollution in India.

Noise Pollution- Sources of noise pollution (industrial source, transport, household, public address system, agricultural machines, defence equipments), effects of noise pollution and control of noise pollution.

Current Environmental Issues: Global warming and green house effect, Acid rain, Ozone its importance and depletion of ozone layer, Eutrophication, PAN formation and its disaster. Disaster management: floods, earthquake, cyclone and landslides.

Electric and Magnetic Fields in the Environment: Introduction, regions in the electromagnetic spectrum, health effects due to electromagnetic fields, introduction to Extremely low frequency Radio and Microwave field, Effect of exposure to extremely low frequencies on humans and animals, Applications of microwaves in environmental science Microwave radiations and their biological effects on human beings, Biological effects of UV radiations.

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.

Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, water shed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. Waste land reclamation. -Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

Human Population and The Environment: Population growth, variation among nations. Population explosion- Family Welfare Programme.

List of reference books:

1. G.M. Masters, Introduction to Environment Engineering and Science, Prentice-Hall India, Second Indian Reprint, 1995.
2. Kiely, G., Environmental Engineering, Irwin McGraw-Hill, Singapore, 1998.
3. J. Glynn Henry and G.W. Heinke, Environmental Science and Engineering, 2nd ed., Prentice Hall, 1996.
4. Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw Hill, 1995.
5. A.R. W. Jackson and J.M. Jackson, Environmental Sciences: The Environment and Human Impact, Longman Publishers, 1996.
6. N. Lee and C. Kirkpatrick (Eds.) Sustainable Development and Integrated Appraisal in a Developing World, Edward, Elgar, UK, 2000.
7. Environmental studies by Benny Joseph (McGraw hill)
8. Perspectives in environmental studies by kaushik and kaushik (new age international publishers)
9. Environmental chemistry and pollution control by s.S.Dara,
10. Elements of environmental engineering by K.N.Duggal (S.chand & company)