Cochin University of Science and Technology, Kerala B.E./B.Tech IT Sem 2 syllabus

Basic Electrical Engineering

Module I

Basic principles of Electric circuits: Review of Ohm’s law - Definition of Resistance,
Current, Voltage and Power - Series and Parallel circuits- Constant voltage source and
Constant current source.
Network Theorems: Kirchhoff’s laws- Network analysis by Maxwell's circulation currents -
Superposition theorem -Thevenin's theorem - Norton's theorem - simple illustrative problems
on network theorems.
Review of electrostatics - Coulomb's Law- Electric field strength and electric flux density,
Capacitance.

Module II

Review of electromagnetic induction -Faraday's Law- Lenz's Law - Mutually induced emf.
Magnetic circuits - Magnetic field of a coil - Ampere turns calculation - Magnetic flux - Flux
density - Field strength.
Measuring instruments: Working principle of galvanometer, Ammeter, Voltmeter, Watt
meter & Energy Meter (elementary concepts).

Module III

AC Fundamentals: Sinusoidal Alternating Waveforms - Sinusoidal AC Voltage
characteristics and definitions –– General representation of voltage or current – Phase
Relations – Average value – Effective (Root mean square) value.
The Basic Elements and Phasors: Response of basic R, L and C elements to a sinusoidal

voltage or current –Phasor diagrams, Frequency response of the basic elements – Average
power and power factor – Complex representation of vectors (Rectangular & polar forms)
Series and Parallel ac Circuits: Series & parallel impedances and admittances, Analysis of
RL, RC & RLC circuits, Resonance in series and parallel circuits- Variation of impedance
and admittance in series and parallel resonant circuits. Power in ac circuits: active, reactive &
apparent power.
Introduction to 3 phase Systems: Star& Delta connection, Power in three phase circuits

Module IV

Electrical Machines: Principle of operation, Types and applications of DC machines,
Transformers and Induction Machines. (Only an elementary qualitative treatment is
envisaged.)
Elementary Concepts of Generation, Transmission, and Distribution: Conventional

sources of electrical energy: Hydro, Thermal, Nuclear and Diesel power station, Non-
conventional Sources: Solar energy, wind energy & energy from oceans, Various levels of

power transmission, introduction to primary and secondary distribution

References:

1. Robert L. Boylestad. Introductory circuit analysis. (Twelfth edition). Pearson
Education, New Delhi. (2012)
2. Cotton, H. Electrical technology. (Seventh edition). CBS Publishers and Distributors,
New Delhi. (2005)
3. Leonard S. Bobrow. Fundamentals of electrical engineering. Oxford University Press,
New Delhi.(1996).
4. Rajendra Prasad. Fundamentals of electrical engineering. (Second edition). PHI
Learning, New Delhi.(2009)
5. Edward Hughes. Electrical technology. Addison Wesley Longman,

Boston. (1995).

Environmental Studies

Module I

Multidisciplinary nature of environmental studies. Definition, scope and importance, need for
public awareness.
Natural Resources: Renewable and non-renewable resources: Natural resources and
associated problems. Forest resources: Use and over-exploitation, deforestation, case studies.
Timber extraction, mining, dams and their effects on forest and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought,
conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using
mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects
of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use
of alternate energy sources. Case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion
and desertification. Role of an individual in conservation of natural resources. Equitable use
of resources for sustainable lifestyles.

Module II

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 ecosystems: - Forest ecosystem, Grassland ecosystem,

Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem
diversity. Biogeographical classification of India. Value of biodiversity: consumptive use,
productive use, social, ethical, aesthetic and option values. Biodiversity at global, National
and local levels. Inida as a mega-diversity nation. Hot-sports of biodiversity. Threats to
biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and
endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of
biodiversity.

Module III
Environmental Pollution: Definition. Cause, effects and control measures of: - a. Air
pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal
pollution g. Nuclear hazards. Solid waste Management: Causes, effects and control measures
of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case
studies. Diaster management: floods, earthquake, cyclone and landslides.
Environmental legislation: 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.

Module IV
Environmental ethics: Issues and possible solutions. Climate change, global warming, acid
rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland
reclamation. Consumerism and waste products.
Social Issues and the Environment: From Unsustainable to Sustainable development.

Urban problems related to energy. Water conservation, rain water harvesting, watershed
management. Resettlement and rehabilitation of people; its problems and concerns. Case
Studies. Public awareness.
Human Population and the Environment: Population growth, variation among nations.
Population explosion – Family Welfare Programme. Environment and human health. Human
Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information
Technology in Environment and human health. Case Studies.
Field work: Visit to a local area to document environmental assets river/ forest/grassland/hill/
mountains. Visit to a local polluted site-
Urban/Rural/Industrial/Agricultural. Study of
common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

References:

1. Rajagopalan, R. Environmental studies: From crisis to cure. Oxford University Press,
New Delhi. (2005).
2. Erach Bharucha. Textbook of environmental studies and ethics. Universities Press
(India), Hyderabad. (2005).
3. Jayashree A. Parikh. Balsaraf, V.M. and Dwivedi, P.B. Environmental studies. Ane
Books Pvt. Ltd, New Delhi. (2010)
4. Anindita Basak. Environmental studies, Pearson, New Delhi. (2009).
5. Misra, S.P. (2011). Essential environmental studies. (Third edition). Ane Books Pvt.
Ltd., New Delhi. (2011).
6. Benny Joseph. Environmental science & engineering, Tata McGraw Hill Education
Pvt. Ltd., New Delhi. (2010).

Basic Electronics Engineering

19-200-0105A/19-200-0205B BASIC ELECTRONICS ENGINEERING

Credits: 3

Module I:

Basic Semiconductor and PN Junction Theory: Atomic Theory, Conduction in Solids, Conductors, Semiconductors and Insulators, n-Type and p-Type semiconductors, Semiconductor conductivity The p-n Junction, Biased Junctions. Junction Currents and Voltages

Module II:

Semiconductor Diodes and Applications: PN Junction Diode, Characteristics and parameters, Diode Approximations, DC Load Line Analysis, Temperature Effects, Diode AC Models, Diode Specifications, Diode Testing, Zener Diodes Half wave rectification, Full wave rectification, RC and LC Filters, Shunt Voltage Regulators, Power supply - performance and Testing Optoelectronic Devices-LED, LCD, Seven segment displays

Module III:

Bipolar Junction Transistors and Electronic measuring instruments: BJT Operation, BJT voltages and currents, BJT Amplification and Switching, Common Base, Common Emitter and Common Collector Characteristics, Transistor Testing Electronic measuring instruments – Power Supply, Function Generator, CRO, Multimeter.

Module IV:

Fabrication of Semiconductor Devices and ICs: Processing of Semiconductor materials, Diode Fabrication and Packaging, Transistor construction and Performance, Transistor Fabrication, Integrated Circuits, IC components and circuits, Transistor and IC packaging, Transistor Data sheets, Power measurement in dB

References:

1. David A Bell, Electronic Devices and Circuits Oxford Higher Education, 5th Edition, (2017).

2. NN Bhargava, DC Kulshreshtha, SC Gupta, Basic Electronics and Linear circuits, Tata McGrawHill Publishing Company, 2nd Edition, (2013).