

# Rajiv Gandhi University of Knowledge and Technology

Basar, Mudhole, Adilabad – 504107

## **B. TECH. ELECTRONICS AND COMMUNICATION ENGINEERING**

### **II YEAR I SEMISTER**

<b>Code</b>	<b>Subject</b>	<b>L-T</b>	<b>P</b>	<b>C</b>
EC2101	Electronic Circuits	4	-	4
EC2102	Semiconductor Devices	4	-	4
EC2103	Signals and Systems	4	-	4
EC2104	Electromagnetic theory	4	-	4
BSBE 2001/3001	Environmental science	4	-	3
HS2101	Soft Skills-I	2	-	1
EC2701	Electronic Circuits Lab	-	3	2
EC2702	Semiconductor Devices Lab	-	3	2
EC2901	Seminar-1	1	-	1
	<b>Total</b>	<b>23</b>	<b>6</b>	<b>25</b>

## **EC2101**

## **Electronic Circuits**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**4-0-4**

### **Course Objectives:**

1. To introduce the fundamental concepts of semiconductor devices.
2. To understand the operation of different types of electronic devices and their corresponding applications.
3. To provide a conceptual foundation on amplifiers that can be used as a basis for further study.

### **Unit-I: Introduction to Electronics**

Introduction to Electronics and Electronic systems, Theory of Semiconductors, pn Junction Diode, Rectifiers: Half Wave Rectifier, Full Wave Rectifier, LEDs, Photo Diodes, Silicon Controlled Rectifier.

### **Unit-2: Transistors**

Bipolar Junction Transistor, Transistor in CB and CE Configurations, Junction Field Effect Transistor, JFET Characteristics, MOSFET, Biasing of Transistors, Biasing of JFET.

### **Unit-3: Amplifiers and Transistor models**

Introduction to Amplifiers, Transistor Re Model, Transistor h parameter model, BJT Small Signal Analysis, JFET Signal Analysis, feedback Amplifiers, Phase Shift Oscillators, Wein Bridge Oscillators

### **Unit-4: Operational Amplifiers**

Differential Amplifiers, operational amplifiers, applications of operational amplifiers:, Constant-Gain Multiplier , Voltage Summing , Voltage Buffer , Controller Sources, Instrumentation Circuits ,Active Filters .

### **Unit-5: Digital Electronics:**

Logic gates, realization of logic gates, flip-flops, registers and counters.

### **TEXT BOOKS:**

1. Electronic Devices and Circuit Theory – Robert L.Boylestad, Louis Nashelsky, 9th edition, 2008 PE
2. Electronic Devices and Circuits- David A. Bell- 5th Edition, Oxford University Press.

### **REFERENCE BOOKS:**

1. Electronic Circuits Analysis and Design – Donald A Neamen, Third Edition, Tata McGraw-Hill, 2007.
2. Introductory Electronic Devices and Circuits- Robert T. Paynter, 7<sup>th</sup> edition, 2009, PEI.
3. Microelectric circuits- sedra/ Smith- 5th edition, 2009, Oxford University Press.

## **EC2102**

## **Semiconductor Devices**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**4-0-4**

### **Course Objectives:**

1. To introduce the fundamental concepts of semiconductor devices like PN junction Diodes, Transistors and special Diodes.
2. To understand the applications of diodes and their operation.
3. To understand the characteristics of Transistors –BJT, FET, MOSFET

### **UNIT -I: Introduction:**

Evolution of semiconductor technology, Types of semiconductors (intrinsic & Extrinsic), mass action law, Concept of fermi level, carrier transport phenomena: Carrier drift, Carrier diffusion, Einstein relation, hall effect.

### **UNIT -II:Diodes:**

Basic structure of pn-junction, operation of pn-diode, non uniformly doped pn-junctions, small signal model of pn-junction, Generation-Recombination currents, Junction breakdowns, diode transients, Tunnel diode, Impatt diode.

### **UNIT -III:BJT:**

Basic BJT action: Principle of operation, modes of operation, Amplification with BJT. Non ideal effects of BJT: Base width modulation, Emitter band gap narrowing, non uniform base doping, breakdown voltage.

### **UNIT -IV: MOSFET:**

C-V characteristics of MOSFET, The MOSFET operation: MOSFET structure, current-voltage relationship (Mathematical), substrate bias effects, small signal equivalent model, short channel & narrow channel effects, Radiation and hot electron effect.

### **UNIT -V:Optical devices:**

Photo detectors, Photoluminescence ,Electroluminescence ,Led and laser

### **TEXT BOOKS:**

1. Electronic Devices and Circuits - J. Millman, Christos C. Halkias, 1991 edition, 2008, TMH.
2. Electronic Devices and Circuits- R.L. Boylestad and Louis Nashelsky, 9th edition, 2006, PHI.
3. Electronic Devices and Circuits – David A. Bell, Fifth Edition, 2008, Oxford University press.

### **REFERENCES:**

1. Integrated Electronic - J.Millman and C.C.Halkias, Satyabratajit, 2<sup>nd</sup> edition, 1998, TMH.
2. Electronic Devices and Circuits - K. Lal kishore, 2nd edition, 2005, BSP.
3. Introduction to Electronic Devices and Circuits – Rober T. Paynter, PE
4. Electronic Devices and Circuits – S. Salivahana, N.Suresh Kumar.

## **EE2103**

## **Signals and Systems**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**4-0-4**

### **Course Objectives:**

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. To teach Sampling theorem, describe the time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
3. To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems.

### **UNIT – I:Introduction**

Classification of signals, Continuous-time signals and systems, signal characteristics; common signals, random signals, systems, and applications

### **UNIT – II:Signal parameters and Continuous LTI systems:**

Signal parameters, The representation of signal in terms of impulses, LTI properties of continuous-time systems, impulse response, convolution, linear constant coefficient differential equations

### **UNIT – III:Fourier series and Fourier Transforms**

Fourier series, Fourier and Laplace transforms, spectrum, statistical description of random signals, Properties of auto and cross-correlation, Ensemble averages, signal simulation.

### **UNIT – IV:Filter designing**

System analysis, frequency response, Properties of power spectral density, analog filters, analog filter design, Butterworth filters, filtering of deterministic and random signals, system simulation, State-space analysis for continuous-time systems .

### **UNIT – V:Discrete time signals and systems**

Discrete-time signals and systems, sampling, convolution, difference equations and digitization.

### **TEXT BOOKS:**

1. Signals, Systems & Communications - B.P. Lathi, 2009,BS Publications.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2<sup>nd</sup> Edition .

## **REFERENCES:**

1. Signals and Systems – A. Ramakrishna Rao - 2008, TMH.
2. Linear Systems and Signals – B. P. Lathi, Second Edition, Oxford University press, 2008.
3. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
4. Signals, Systems and Transforms - C. L. Philips, J. M. Parr and EveA. Riskin, Pearson education.3<sup>rd</sup>

## **EC2104**

## **Electromagnetic Theory**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**4-0-4**

### **Course Objectives:**

1. To explain the mathematical fundamentals necessary for understanding the electromagnetic theory.
2. To teach the electrostatics and magnetic along with Maxwell's equations for EM Waves.
3. To present the concepts of transmission lines, and this is a prerequisite course for "Antennas".

### **Unit I:**

Maxwell's equations, displacement current, equation of continuity, boundary conditions.

### **Unit II:**

Propagation of uniform plane waves in perfect dielectric and in lossy medium, polarization and poynting vector, reflection, refraction, phase and group velocities,

### **Unit III:**

Transmission line: evaluation of line parameters, design concepts, cutoff frequency, attenuation, dispersion, power handling capacity.

### **Unit IV:**

Travelling waves, standing waves, Smith chart and matching techniques, pulse propagation.

### **Unit V:**

Radiation concept: elementary dipole, half wave dipole, radiation patterns, gain, pattern multiplication, basic antenna types.

### **TEXT BOOKS:**

1. "Elements of Electromagnetics", Matthew N.O. Sadiku, 4thedition, 2008, Oxford University Press
2. "Engineering Electromagnetics", William H. Hayt Jr. and John A. Buck, 7thedition, 2006, TMH
3. "Networks Lines and Fields", John D. Ryder, 2ndedition, 1999, PHI

### **REFERENCE BOOKS:**

1. "Electromagnetic Waves and Radiating Systems", E.C. Jordan and K.G. Balmain, 2ndedition.,2000, PHI
2. "Transmission Lines and Networks", Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi

## **BSBE 2001/3001**

## **ENVIRONMENTAL SCIENCES**

**Externals: 60 Marks**

**Internals: 40 Marks**

**(L-T)-P-C**

**4-0-3**

### **Learning Objectives:**

The syllabus aims to:

- Stimulate interest in the environment and endeavours to generate awareness about environmental concerns among students.
- Develop an understanding of how natural resources and the environment affect quality of life and the quest for sustainable development.
- Develop knowledge and understanding of environmental issues and principle and apply their knowledge to mitigate the environmental problems.
- Understand and resolve some of today's most challenging scientific and policy issues—including global climate change, pollution, biodiversity conservation, sustainability, environmental pollution and toxic waste disposal, disease control, disaster management, socio-environmental issues and balancing resource use and preservation.
- Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.
- Recognizes the global changes and responses for attaining a more sustainable environment.

### **UNIT 1: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**

Definition, scope and importance, need for public awareness.

### **UNIT 2: NATURAL RESOURCES:**

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

f) 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.

### **UNIT 3: ECOSYSTEMS & BIODIVERSITY**

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:-

- a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
- b. Biodiversity- Definition : genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- c. Biodiversity at global, National and local levels. India as a mega-diversity nation Hotspots of biodiversity.
- d. 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.

### **UNIT 4: ENVIRONMENTAL POLLUTION**

Definition, Cause, effects and control measures of :- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, 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.
- Disaster management: floods, earthquake, cyclone and landslides.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Environment Protection Act., Air (Prevention and Control of Pollution) Act. Water Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act .



## **UNIT 5 : SOCIAL ISSUES & THE ENVIRONMENT**

Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

**Field work:** Visit to a local area to document the environmental assets river/forest/grassland/hill/mountain 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 :**

- a). Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- b). Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad- 380 013, India, Email:mapin@icenet.net (R)
- c). Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- d) Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
- e). Cunningham, W.P. Cooper, T.H. Gorhan i, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 116p .

**HS2101**

**Soft Skills I**

**Externals:**

**L-T-P-C\***

**Internals:**

**2-0-0-1**

**Objectives:**

- To implement practically the skills needed for employment.
- To deal with the society in an acceptable way.
- To make them competent to attempt and qualify in various tests.
- To make them proficient in using vocabulary in various situations.

**UNIT-I**

**Vocabulary Building** – Teaching Root words – Word association - How to talk about Personality Type - How to talk about Doctors - How to talk about Various Practitioners - How to talk about Science and Scientists - How to talk about various Speech Habits - How to insult your enemies - How to flatter your friends - How to talk about a variety of personal characteristics - How to talk about actions

**UNIT-II**

**Common Errors in English**

**UNIT-III**

**Twenty -four seven** - L for gist - NDTV debates - L for specific information - Ted Talks - L for detail - Devils' Advocate - **Picture perception** – Describing people, paintings, cartoons etc.

**UNIT-IV**

**Read between the lines** – R for Pleasure - Reading Newspaper - Movie Reviews - **R for Specific information** – Essays - Textbooks

**UNIT-V**

**Now you are talking** - Giving Opinions - Stating Facts - Agree and disagree - Decisions and Intentions - Raising Questions - Giving and receiving effective feedback

**UNIT –VI**

**Writing Dialogue**

**Suggested References:**

1. **Word Power Made Easy**
2. **Ted Talks**
3. **NDTV Talks**
4. **Newspapers ( The Hindu, Times of India)**

**EC2701**

**Electronic Circuits Lab**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**0-3-2**

**LIST OF EXPERIMENTS:**

1. Familiarization with electronic components and usage of multimeter (measurement of resistance, classification of capacitors, diode testing)
2. Familiarization with Oscilloscope, signal generator and further usage of multimeters
3. Frequency response and square wave resting of R-C, C-R and R-L networks
4. Half-wave and full-wave rectifiers, rectification with capacitive filters, zener diode and IC regulation
5. Studies on CE amplifiers
6. Studies on Analog Circuits using OP-AMP
7. Studies on logic gates
8. Studies on 555 circuits, J-K flip-flop, counters and shift registers

**EC2702**

**Semiconductor Devices Lab**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**0-3-2**

**LIST OF EXPERIMENTS:**

1. JFET Characterization
2. Diode Breakdown Characteristics
3. Capacitance-Voltage characteristics of a PN junction (Doping Profile)
4. High frequency characteristics of BJT
5. SCR/TRIAC Characteristics
6. Hall Effect
7. MOS Capacitor Characterization
8. MOSFET Characterization
9. Bipolar Device Characterization
10. Semiconductor Device Simulation
11. MOS Capacitor Fabrication

**EC2901**

**Seminar - I**

**Externals: 60Marks**

**(L-T)-P-C**

**Internals: 40Marks**

**1-0-1**

**Objectives:**

- To improve the presentation skills
- To prepare PPT more effectively

Student has to choose a general topic to give a power point presentation