**Four Year Degree Course in Engineering and Technology**
**Course and Examination Scheme with Model AICTE Curriculum**
**Third Semester Electronics & Communication Engineering/ Electronics & Telecommunication Engineering**

| Course Category | Course Code | BoS | Course title | Teaching Scheme | | | | Examination Scheme | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Hours Per Week | | | Number of Credits | THEORY | | | | | | PRACTICAL | | | |
| | | | | L | T | P | | Duration of Paper (Hrs.) | Max. Marks ESE | Max. Marks Sessional | | Total | Min. Passing Marks | Max. Marks TW | Max. Marks POE | Total | Min. Passing Marks |
| | | | | | | | | | | MSE | IE | | | | | | |
| BSC/ESC/HSMC | SE101 | Science & Humanities | Mathematics-III | 3 | 1 | 0 | 4 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE102 | Electronics | Electronic Devices | 3 | 0 | 0 | 3 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE103 | Electronics | Digital System Design | 3 | 0 | 0 | 3 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE104 | Electronics | Signals and Systems | 3 | 0 | 0 | 3 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE105 | Electrical | Network Theory | 3 | 1 | 0 | 4 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| **Laboratory** | | | | | | | | | | | | | | | | | |
| PCC | SE106 | Electronics | Electronic Devices Lab | 0 | 0 | 2 | 1 | - | - | - | - | - | - | 25 | 25 | 50 | 25 |
| PCC | SE107 | Electronics | Digital System Design Lab | 0 | 0 | 2 | 1 | - | - | - | - | - | - | 25 | 25 | 50 | 25 |
| PCC | SE108 | Electronics | Signals and Systems Lab | 0 | 0 | 2 | 1 | - | - | - | - | - | - | 25 | 25 | 50 | 25 |
| MC | SE109 | Science & Humanities | Environmental Science | 0 | 0 | 2 | 0 | | | | | | | | | | |
| | | **Total** | | **15** | **2** | **8** | | | | | | **500** | | | | **150** | |
| | | **Semester Total** | | **25** | | | **20** | **650** | | | | | | | | | |

**Four Year Degree Course in Engineering and Technology**
**Course and Examination Scheme with Model AICTE Curriculum**
**Fourth Semester Electronics & Communication Engineering/ Electronics & Telecommunication Engineering**

| Course Category | Course Code | BoS | Course title | Teaching Scheme | | | | Examination Scheme | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Hours Per Week | | | Number of Credits | THEORY | | | | | | PRACTICAL | | | |
| | | | | L | T | P | | Duration of Paper (Hrs.) | Max. Marks ESE | Max. Marks Sessional | | Total | Min. Passing Marks | Max. Marks TW | Max. Marks POE | Total | Min. Passing Marks |
| | | | | | | | | | | MSE | IE | | | | | | |
| BSC/ESC/HSMC | SE201 | Management | Business Economics | 3 | 0 | 0 | 3 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE202 | Electronics | Probability, random process and numerical method | 3 | 0 | 0 | 3 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE203 | Electronics | Analog and Digital Communication | 3 | 0 | 0 | 3 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE204 | Electronics | Analog Circuits | 3 | 1 | 0 | 4 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| PCC | SE205 | Electronics | Microprocessor and Microcontrollers | 3 | 1 | 0 | 4 | 3 | 80 | 10 | 10 | 100 | 40 | -- | -- | -- | -- |
| **Laboratory** | | | | | | | | | | | | | | | | | |
| PCC | SE206 | Electronics | Analog and Digital Communication Lab | 0 | 0 | 2 | 1 | - | - | - | - | - | | 25 | 25 | 50 | 25 |
| PCC | SE207 | Electronics | Analog Circuits Lab | 0 | 0 | 2 | 1 | - | - | - | - | - | | 25 | 25 | 50 | 25 |
| PCC | SE208 | Electronics | Microprocessor and Microcontrollers Lab | 0 | 0 | 2 | 1 | - | - | - | - | - | | 25 | 25 | 50 | 25 |
| | | **Total** | | **15** | **2** | **6** | | | | | | **500** | | | | **150** | |
| | | **Semester Total** | | **23** | | | **20** | **650** | | | | | | | | | |

**A. Definition of Credit:**

**1 Hr. Lecture (L) per week 1 credit**
**1 Hr. Tutorial (T) per week 1 credit**
**2 Hours Practical(Lab)/week 1 credit**

**B. Range of credits – A credits of 160 is required for a student to be eligible to get Under Graduate degree in Engineering.**

.

**C. Structure of Undergraduate Engineering program :**

| S.No | Abbreviations | Category | Suggested Breakup of Credits(Total 160) |
|---|---|---|---|
| 1 | HSMC | Humanities and Social Sciences including Management courses | 12* |
| 2 | BSC | Basic Science courses | 25* |
| 3 | ESC | Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc | 24* |
| 4 | PCC | Professional core courses | 48* |
| 5 | PEC | Professional Elective courses relevant to chosen specialization/branch | 18* |
| 6 | OEC | Open subjects – Electives from other technical and /or emerging subjects | 18* |
| 7 | PROJ | Project work, seminar and internship in industry or elsewhere | 15* |
| 8 | MC | Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition] | (non-credit) |
| Total | | | 160* |

***Minor variation is allowed as per need of the respective disciplines.**

**Abbreviations**

| | | | |
|---|---|---|---|
| L | Lecture | MC | Mandatory courses |
| T | Tutorial | PROJ | Project |
| P | Practical | MSE | Mid Semester Examination |
| BSC | Basic Science Courses | IE | Internal Evaluation |
| ESC | Engineering Science Course | ESE | End Semester Examination |
| HSMC | Humanities and Social Sciences including Management courses | TW | Term work |
| PCC | Professional core courses | POE | Performance & Oral Examination |
| PEC | Professional Elective courses | BoS | Board of Studies (Board) |
| OEC | Open Elective courses | | |

# Gondwana University,

# Gadchiroli

## ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING SYLLABUS

Model Curriculum

III/IV Semesters (AY:2020-21)

Syllabus

**Board of Studies in Electronics Engineering**

,

**AUDIT HEADS:**

The students shall be required to qualify in minimum 10(TEN) Audit Heads from the available list. The Students shall be at the liberty to acquire assigned FIVE(05) non-academic Credits by the time he/she appears for the first ESE of VI semester of the Program. The Colleges shall send list of Ten Audit Heads qualified(Q) by the student and their single composite Grade Point(G) by that time. The Audit Heads shall be considered only if undertaken during the tenure of this program, during its first three years. For qualifying, the student has to secure minimum grade point of "5" in TEN different Audit Heads. The Audit Course Credits shall not be counted for calculation of GPA.

The Audit Heads Grade Point shall be shown in the Grade Sheet of VI semester B.E. in all the programs. If the composite Grade Points (G) is not sent from the college side till the above prescribed time, then such student shall be shown "F" (Fail) in the Grade Sheet of VI semester. The College shall send consolidated list of all the students in the Program and their "Composite Grade Point" in respect of Audit Heads qualified by them in the prescribed format "Form-AHCI".

**The following Audit Heads shall be available to the students**:

| | | | | | |
|---|---|---|---|---|---|
| A | National Social Service(NSS) | H | National Cadet Corps (NCC) | O | Blood Donation |
| B | Paper Presentation | I | Quiz Competition | P | Debate Competition |
| C | Computer/Software/ Campus Recruitment courses (3-5 days) | J | Office Bearer in Departmental or higher Students Body/Professional Society (College level) | Q | Soft skills Development Course (3-5 days) |
| D | Hardware/Software Competition participation | K | Volunteer in minimum inter collegiate activities | R | Sports Team Participation |
| E | YOGA/Meditation Training Certificate (Minimum Three Days) | L | Cultural Activity Competition, National , State, District level Essay Competition. | S | Certificate of Noteworthy participation in National event like SWACHCHHA BHARAT ABHIYAAN, TREE PLANTATION |
| F | Certificate of service to the Home for the Aged/Orphans/Differently enabled (1-3 days) | M | Membership of any registered Non-Government Organization(NGO) | T | Plant/Industrial Visit |
| G | Certificate of Appreciation by local Civic/District /State/ National level Government Authority/Organizations | N | Certificate of Noteworthy participation in Environment Day/AKSHAY URJA Day or such other programs of national importance/Environmental day, Science day, Engineers Day, Teachers day etc. | U | Participation in 3 to 5 days youth Seminars on Social, Environmental, Wellbeing, Consciousness Programs. |

The Audit Heads may be appended/revised/changed from time to time and shall be notified by the University.

# III SEMESTER B.E.

# ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING SYLLABUS

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE101

Title of the Course : Mathematics-III

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 1 | 0 | 4 | 4 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Solve matrix and its inverse on linear simultaneous equations.
3. Develop methods to solve ordinary and partial differential equations.
4. Make use of Fourier analysis to periodic and aperiodic signals
5. Solve engineering problems using Laplace's Transform

| Units | Contents | Hours |
|---|---|---|
| 1 | Laplace Transform: Definition& conditions for existence ; Transforms of elementary functions; Properties of Laplace transforms : Linearity property, first shifting property, second shifting property, multiplication by t ,division by t , change of scale property, transforms of derivatives, transforms of integrals of functions; Evaluation of definite integrals by using Laplace transform, Transforms of some special functions- periodic function, Heaviside unit step | 9 |
| 2 | Inverse Laplace Transform: Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients | 9 |
| 3 | Fourier Integral &Transform: Definitions – Fourier integral theorem (without proof) ; Fourier sine and cosine integrals ; Complex form of Fourier integrals ; Fourier sine and cosine transforms ; Properties of Fourier transforms ; Parseval's identity for Fourier Transforms | 9 |
| 4 | Partial Differential Equations: Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables | 9 |
| 5 | Matrices: Inverse of matrix by partitioning method, Rank of a matrix and consistency of system of linear simultaneous equations. , Eigen values and Eigen vectors, Reduction to diagonal form Cayley-Hamilton Theorem, Sylvester's Theorem (statements only) Solution of second order linear differential equation by matrix method. | 9 |
| | **Total** | 45 |

**TEXT BOOKS / REFERENCE BOOKS:**


1. A Text book of Applied Mathematics Volume I and II by J. N. Wartikar and P. N. Wartikar.
2. Higher Engineering Mathematics by B. S. Grewal Khanna Publishers.
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by Erwins Kreyszig.

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE102

Title of the Course : Electronic Devices

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 0 | 0 | 3 | 3 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Understand the principles of semiconductor Physics
2. Design half wave and full wave rectifiers with filters.
3. Characterize the current flow of a bipolar transistor in CB,CE and CC configurations
4. Realize simple amplifier circuits using BJT biasing

| Units | Contents | Hours |
|---|---|---|
| 1 | **Semi-Conductor Physics** : Insulators, Semiconductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semiconductors, extrinsic semiconductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors | 9 |
| 2 | **Junction Diode Characteristics**: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, Avalanche&Zener breakdown, Zener Diode and its application. | 9 |
| 3 | **Rectifiers and Filters**: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors. | 9 |
| 4 | **BJT**: Junction transistor, transistor current components, transistor equation, transistor configurations, and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through. FET: FET types, construction, operation, characteristics, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET. | 9 |
| 5 | **Transistor Biasing and Thermal Stabilization** : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias, Stabilization against variations in VBE, Ic, and β, Stability factors, Bias compensation, Thermal runaway, Thermal stability. | 9 |
| | **Total** | 45 |

**Text Books/Reference Books:**


1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition
2. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.
3. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition
4. Electronic Devices and Circuits-David A Bell Oxford University Press Fifth Edition

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE103

Title of the Course : Digital System Design

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 0 | 0 | 3 | 3 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Design and analyze combinational logic circuits
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
3. Design & analyze synchronous sequential logic circuits
4. Use HDL & appropriate EDA tools for digital logic design and simulation

| Units | Contents | Hours |
|---|---|---|
| 1 | Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan'sTheorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, CodeConversion | 9 |
| 2 | MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU | 9 |
| 3 | Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Rippleand Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, PseudoRandom Binary Sequence generator, Clock generation | 9 |
| 4 | Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices | 9 |
| 5 | VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits | 9 |
| | **Total** | 45 |

**Text Books/ Reference books:**


1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE104

Title of the Course : Signals and Systems

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 0 | 0 | 3 | 3 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Analyze different types of signals
2. Represent continuous and discrete systems in time and frequency domain using differenttransforms
3. Investigate whether the system is stable
4. Sampling and reconstruction of a signal

| Units | Contents | Hours |
|---|---|---|
| 1 | Signals and systems as seen in everyday life, and in various branches of engineering and science. Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability | 9 |
| 2 | Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input output behaviour with aperiodic convergent inputs. Characterization of causality and stability of linear shift-invariant systems. System representation through differential equations and difference equations | 9 |
| 3 | Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and orthogonal bases | 10 |
| 4 | The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems- eigen functions, region of convergence, z-domain analysis | 9 |
| 5 | The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems. State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role | 8 |
| | **Total** | 45 |

**Text Books:**


1. “Signals and Systems” by Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, Publication: Prentice Hall of India.
2. “Signals and Systems” by P. Ramesh Babu, R. AnandaNatarajan, SciTech Publications (India).


**Reference books:**


1. “Signals and Linear Systems” by Gabel R.A. and Robert R.A, John Wiley and Sons, New York.
2. “Systems and Signal Analysis” by C. T. Chen Publication: Oxford University Press, India.
3. “Introduction to Signals and Systems” by Michael J. Robert, Publication: Tata Mc-Graw Hill.
4. “Signals and Systems” by S. Haykin and B. V. Veen, Publications: John Wiley and Sons, Inc.
5. “Signals and Systems Analysis using, Transform Methods and MATLAB” by M. J. Roberts Tata McGraw-Hill Publishing Company Limited

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE105

Title of the Course : Network Theory

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 1 | 0 | 4 | 4 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques

| Units | Contents | Hours |
|---|---|---|
| 1 | Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactances, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. Circuits | 9 |
| 2 | Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation | 9 |
| 3 | Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions | 9 |
| 4 | Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and Two four port network and interconnections, Behaviors of series and parallel resonant circuits | 9 |
| 5 | Introduction to band pass, low pass, high pass and band reject filters | 9 |
| | **Total** | 45 |

**Text Books/ Reference books:**


1. Van, Valkenburg.; "Network analysis"; Prentice hall of India, 2000
2. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE106

Title of the Course : Electronic Devices Lab

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 1 | 0 | 0 | 25 | 25 | 50 |

**Hands-on experiments related to the course contents: SE102**

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE107

Title of the Course : Digital System Design Lab

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 1 | 0 | 0 | 25 | 25 | 50 |

**Hands-on experiments related to the course contents: SE103**

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE108

Title of the Course : Signals and Systems Lab

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 1 | 0 | 0 | 25 | 25 | 50 |

**Hands-on experiments related to the course contents: SE104**

**THIRD SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE109

Title of the Course : Environmental Science

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Understand basics of environmental ecosystem.
2. Analyse threats to Bio-diversity and Conservation of Bio-diversity.
3. Apply impacts on environment and human communities.
4. Appreciate the environmental movements, ethics.

**Approach of Experimental Studies -**

**Innovative Case studies based on following five units. Every student had to submit five innovative case studies based on above Syllabus but can go beyond syllabus on the similar approach.**

| Units | Contents | Hours |
|---|---|---|
| 1 | Scope and nature of Environmental science, Man and Environment, Structure and function of ecosystem; energy flow in the aquatic ecosystem | 5 |
| 2 | Environmental pollution: types, causes, effects and controls of air and water pollution, climate change, global warming, green house effect, ozone layer depletion | 5 |
| 3 | Land resources and land use changes, land degradation, soil erosion and desertification, Alternate energy resources, Deforestation.<br>Water: Use and over exploitation of surface and ground water, floods, droughts, conflicts over water (national and inter-state) | 6 |
| 4 | Levels of biological diversity: genetic, species, and ecosystem diversity, Conservation of biodiversity, Biogeographic zones of India.<br>Threat to biodiversity: Habitat loss, poaching of wild life, man-wild life conflicts, Endangered and endemic species of India. | 7 |
| 5 | Human population growth: Impacts on environment, human health and welfare. Disaster management: floods, earthquakes, cyclones and landslides.<br>Environmental ethics, Environmental education, awareness and audits. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan | 7 |
| | **Total** | 30 |

**Text Books/Reference books:**


1. Panigrahi, A.K. and AlakaSahu, 2014 - A text book of Environmental studies. Giribala Publications, Berhampur.
2. Carson, R. 2002 - Silent spring. Houghton Mittlin Harcourt
3. Gleeson, B. and Low, N. (eds) 1999 - Global ethics and environment. London
4. Odum, EP, Odum, HT and Andrews, J. 1971- Fundamentals of Ecology, Philadelphia, Saunders.
5. Singh, JS, Singh, SP and Gupta SR. 2014 - Ecology, Environmental Science and conservation. S. Chand Publications, New Delhi.
6. Smith, R.L. (2008); Ecology and Field biology, USA

# IV SEMESTER B.E.

# ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING SYLLABUS

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE201

Title of the Course : Business economics

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 0 | 0 | 3 | 3 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. To familiarize the prospective engineers with elementary Principles of Economics and Business Economics.
2. To acquaint the students with tools and techniques that are useful in their profession in Business Decision Making which will enhance their employability;
3. To apply business analysis to the "firm" under different market conditions;
4. To apply economic models to examine current economic scenario and evaluate policy options for addressing economic issues

| Units | Contents | Hours |
|---|---|---|
| 1 | Business Economics and its role in managerial decision making- meaning-scope-relevance-economic problems-scarcity Vs choice Basic concepts in economics-scarcity, choice, resource allocation- Trade-off-opportunity cost-marginal analysis- marginal utility theory, Law of diminishing marginal utility -production possibility curve.Basics of Micro Economics IDemand and Supply analysis- equilibrium-elasticity (demand and supply) Production concepts-average product-marginal product-law of variable proportions- Production function-Cobb Douglas function-problems | 10 |
| 2 | Concept of costs-marginal, average, fixed, variable costs-cost curves-shut down point-long run and short run Break Even Analysis-Problem-Markets-Perfect Competition, Monopoly and Monopolistic Competition, Oligopoly- Cartel and collusion | 9 |
| 3 | Circular flow of income-two sector and multi-sector models- National Income Concepts-Measurement methods-problems-Inflation, deflation Trade cycles-Money-stock and flow concept-Quantity theory of money-Fischer's Equation and Cambridge Equation -velocity of circulation of money-credit control methods-SLR, CRR, Open Market Operations-Repo and Reverse Repo rate-emerging concepts in money-bit coin | 9 |
| 4 | Investment analysis-Capital Budgeting-NPV, IRR, Profitability Index, ARR, Payback Period Business decisions under certainty-uncertainty-selection of alternatives-risk and sensitivity- cost benefit analysis-resource management | 9 |
| 5 | Balance sheet preparation-principles and interpretation-forecasting techniques Hrs.)-business financing- sources of capital- Capital and money markets-international financing-FDI, FPI, FII-Basic Principles of taxation-direct tax, indirect tax-GST | 9 |
| | **Total** | 45 |

**Text Books:**


1. Geetika, Piyali Ghosh and Chodhury, Managerial Economics, Tata McGraw Hill,2015
2. Gregory Mankiw, Principles of Macroeconomics, Cengage Learning,2006.
3. M.Kasi Reddy and S.Saraswathi, Economics and Financial Accounting. Prentice Hallof India. NewDelhi


**Reference books:**


1. Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition,2010.
2. Khan M Y, Indian Financial System, Tata McGraw Hill, 7th edition,2011.
3. Samuelson, Managerial Economics, 6thedition,Wiley
4. Snyder C and Nicholson W, Fundamentals of Microeconomics, Cengage Learning (India), 2010

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE202

Title of the Course : Probability, random process and numerical method

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 0 | 0 | 3 | 3 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Understand representation of random signals
2. Investigate characteristics of random processes
3. Make use of theorems related to random signals
4. understand propagation of random signals in LTI systems

| Units | Contents | Hours |
|---|---|---|
| 1 | Introduction to Probability; Sets, Fields and Events; Axiomatic Definition of Probability; Joint, Conditional and Total Probabilities; Independence; Bayes' Theorem and Applications; Bernoulli Trials; The Poisson Law | 9 |
| 2 | Definition; Probability Distribution Function, Probability Density Function; Continuous, Discrete and Mixed Random Variables; Functions of Random Variable; Expected Value of Random Variable; Moments; Moment Generating Functions | 9 |
| 3 | Joint Distribution and Densities; Independence of Two Random Variables: Functions of two random variables; Moments of Random Variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds; Schwarz inequality | 9 |
| 4 | Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem | 9 |
| 5 | Random process; Time averages of Random Processes; Stationary processes; Mean and covariance functions; Ergodicity; Transmission of random process through LTI; Power spectral density; Wide Sense Stationary Processes; Bandlimited Random Processes; Entropy | 9 |
| | **Total** | 45 |

**Text Books:**


1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill


**Reference books:**


1. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
3. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
4. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE203

Title of the Course : Analog and Digital Communication

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 0 | 0 | 3 | 3 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Analyze different components of analog communication systems such as modulator, demodulator, mixer, receiver etc in time and frequency domain.
2. Compare analog communication systems on the basis of bandwidth, power requirement and the performance in the presence of noise.
3. Design the modulators, demodulators for amplitude and frequency modulated systems.
4. Compare the digital modulation techniques in the presence of noise.
5. Analyze the performance of waveform coding techniques.

| Units | Contents | Hours |
|---|---|---|
| 1 | Elements of Communication system, need of modulation, Review of Fourier analysis, Amplitude Modulation (AM), DSB-SC, SSB and VSB transmissions: mathematical Analysis, time and frequency domain analysis, modulation index, Generation and Detection methods , power requirement of these systems, frequency division multiplexing | 10 |
| 2 | Frequency Modulation (FM), Narrowband FM, Wideband FM: time and frequency domain analysis, modulation index, Transmission Bandwidth of FM Waves, Generation of FM waves: Direct and Indirect Methods, Demodulation of FM, Phase Locked Loops, comparison between AM & FM, Phase Modulation, Relation between FM and PM | 9 |
| 3 | Basic receiver (TRF), Super heterodyne receiver for AM and FM, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AGC technique, Sources of noise, Signal to Noise Ratios, Figure of Merit Calculations, Noise in AM, Pre emphasis and De emphasis in FM, Comparison of Noise Performance of different modulation schemes | 8 |
| 4 | Sampling theorem, Aliasing effect, concept, generation and detection - pulse amplitude modulation (PAM), pulse width modulation (PWM), pulse position modulation (PPM), pulse code modulation (PCM), DPCM, Companding, A-law and μ-law companding, delta modulation(DM), adaptive delta modulation(ADM), time division multiplexing | 9 |
| 5 | Model of Digital Communication system, Gram-Schmidt orthogonalization procedure, Digital Band pass Modulation techniques such as ASK, FSK, BPSK, QPSK, QAM. Coherent and non-coherent detection, M-array Modulation Techniques-M-array PSK:- signal constellation diagram, bandwidth, probability of error | 9 |
| | **Total** | 45 |

**Text Books:**


1. George Kennedy, “Electronic Communications”, McGraw Hill Kennedy
2. Simon Haykin, “Digital Communications”, John Wiley and Sons
3. B.P.Lathi and Zhi Ding, “Modern Digital and Analog Communication Systems”, (Fourth edition), Oxford University Press


**Reference books:**


1. Bernard Sklar, “Digital Communications - Fundamentals and Applications”, Pearson Education Asia.
2. K. N. HariBhat and D. Ganesh Rao, “Digital Communications – Theory and Lab Practice”, Third Edition, Pearson
3. Simon Haykin, “An introduction to analog & digital communications”, John Wiley & Sons

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE204

Title of the Course : Analog Circuits

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 1 | 0 | 4 | 4 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Examine the effect of capacitance on the frequency response of Multistage Amplifier.
2. Analyze different topology of negative feedback amplifier
3. Determine various performance parameters of differential amplifier and their significance.
4. Design sinusoidal and non-sinusoidal oscillators
5. Understand the functioning of OP-AMP and design OP-AMP based circuits

| Units | Contents | Hours |
|---|---|---|
| 1 | Diode circuits, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier | 9 |
| 2 | Power amplifier and feedback amplifier: various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues, feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin. | 9 |
| 3 | Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators | 9 |
| 4 | Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR, Current mirror, Design of differential amplifier for a given specification, design of gain stages and output stages, compensation, basic block diagram of OP-AMP and their characteristics. | 9 |
| 5 | Op-Amp applications: Review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications, active filters: Low pass, high pass, band pass and band stop, design guidelines | 9 |
| | **Total** | 45 |

**Text Books/Reference books:**


1. Integrated Electronics, Jacob Millman, Christos C. Halkias, 3E, Tata McGraw Hill, 2006
2. Op-amps and Linear Integrated Circuits, R. A. Gayakwad, 4 edition, Prentice Hall of India, 2008.
3. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE205

Title of the Course : Microprocessor and Microcontrollers

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 3 | 1 | 0 | 4 | 4 | 3 | 10 | 10 | 80 | 100 |

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Do assembly language programming
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
3. To study the architecture of 8051 microcontroller.
4. Develop systems using microcontrollers.

| Units | Contents | Hours |
|---|---|---|
| 1 | Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors (with examples of 8085 and 8086); | 10 |
| 2 | Interfacing with peripherals - timer, serial I/O, parallel I/O, A/D and D/A converters; Arithmetic Coprocessors; System level interfacing design (with examples of 8085 and 8086); | 9 |
| 3 | Concepts of virtual memory, Pipelining, Cache memory, Advanced coprocessor Architectures- 286, 386, 486, Pentium;, | 8 |
| 4 | Architecture of Microcontrollers: 8051, SFRs, I/O ports, Instruction set, Addressing mode, Assembly language programming | 9 |
| 5 | Programming 8051 timer, Serial port programming, Interrupt programming, LCD & keyboard interfacing, ADC & DAC interfacing, Memory Interfacing, Stepper motor and waveform generator | 9 |
| | **Total** | 45 |

**Text Books/Reference books:**


1. R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996
2. D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface. Morgan Kaufman Publishers.
3. Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
4. Kenneth J. Ayala, The 8051 Microcontroller, Penram International Publishing, 1996

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE206

Title of the Course : Analog and Digital Communication Lab

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 1 | 0 | 0 | 25 | 25 | 50 |

**Hands-on experiments related to the course contents: SE203**

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE207

Title of the Course : Analog Circuits Lab

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 1 | 0 | 0 | 25 | 25 | 50 |

**Hands-on experiments related to the course contents: SE204**

**FOURTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

Course Code : SE208

Title of the Course : Microprocessor and Microcontrollers Lab

| Course Scheme | | | | | Evaluation Scheme (Theory) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Periods/ week | Credits | Duration of paper (in hrs) | MSE | IE | ESE | Total |
| 0 | 0 | 2 | 2 | 1 | 0 | 0 | 25 | 25 | 50 |

**Hands-on experiments related to the course contents: SE205**