**Vinoba Bhave University , Hazaribagh**

# RAMGARH ENGINEERING COLLEGE

(Estd. by Govt. of Jharkhand & run by Techno India under PPP)

## Department of
## Electronics and Communication Engineering

# SEMESTER-V

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC501** | **Microprocessor& Interfacing** | **L** | **T** |
| | | **3** | **1** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | **Understand the evolution of 8085 microprocessor and its architecture.** |
| CO2 | **Understand the evolution and architectures of 8086 microprocessor.** |
| CO3 | **Analyze and understand the instruction set and programming of 8085 microprocessor.** |
| CO4 | **Understand the Interfacing of 8085 Microprocessor with Different I/O peripherals.** |
| CO5 | **Understand the exception, interrupts and interrupt handling schemes.** |

| Module | Course Content | No. of Lecture |
|---|---|---|
| **1** | Introduction to Microprocessor, Components of a Microprocessor: Registers, ALU and control & timing, System bus (data, address and control bus), Microprocessor systems with bus organization. Microprocessor Architecture and Operations, Memory, I/O devices, Memory and I/O operations. | **8** |
| **2** | 8085 Microprocessor Architecture, Address, Data and Control Buses, 8085 Pin Functions, Demultiplexing of Buses, Generation of Control Signals, Instruction Cycle, Machine Cycles, T-States, Memory Interfacing. | **9** |

| | | |
|---|---|---|
| **3** | Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction and Data Formats, Writing, Assembling & Executing a Program, Debugging the Programs.<br>Writing 8085 assembly language programs with decision, making and looping using data transfer, arithmetic, logical and branch instructions.<br>Stack & Subroutines, Developing Counters and Time Delay Routines, Code Conversion, BCD Arithmetic and 16-Bit Data operations | **9** |
| **4** | Interfacing Concepts, Ports, Interfacing Of I/O Devices, Interrupts In 8085, Programmable Interrupt Controller 8259A, Programmable Peripheral Interface 8255A. | **9** |
| **5** | Advanced Microprocessors:<br>8086 logical block diagram and segments, 80286: Architecture, Registers (Real/Protected mode), Privilege levels, descriptor cache, Memory access in GDT and LDT, multitasking, addressing modes, flag register. | **9** |

**Text Books:**


1. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh S. Gaonkar Pub: Penram International.
2. Microprocessors and Interfacing, N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, Oxford
3. Advanced Microprocessors, Daniel Tabak, McGrawHill
4. Microprocessor & Interfacing - Douglas Hall, TMH
5. 8086 Programming and Advance Processor Architecture, Savaliya M. T., WileyIndia
6. The 8088 and 8086 Microprocessors, Triebel & Singh, Pearson Education.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC502** | **Digital Communication System** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | Evaluate the performance of PCM, DPCM and DM in a digital communication system |
| CO2 | Perform various multiplexing Techniques |
| CO3 | Design encoder and decoder schemes for error control |
| CO4 | Obtain the power spectra of digital modulated signals. |
| CO5 | Understand noise as a random process and its effect on communication receivers |

**Detailed Syllabus:**

| Module | Course Content | No. of Lecture |
|---|---|---|
| **1** | **Introduction:** A historical perspective in the development of digital communication, Elements of digital communication system.<br>**Source encoding:** Pulse code modulation, quantization noise, linear and non-linear quantization, companding. Differential pulse code modulation, delta modulation, adaptive delta modulation, Delta sigma modulation, linear predictive coders. | **8** |
| **2** | **Multiplexing:** Introduction to different type of multiplexing, Frequency Division & Time Division Multiplexing, Multiplexing hierarchy, synchronous and asynchronous multiplexing, pulse staffing and word staffing.<br>**Baseband transmission:** Baseband signal receiver, integrate and dump type filter probability of error calculations, optimum filters, coherent reception, matched filter and its transfer function. Probability of error of matched filter. Regenerative repeater, Bit synchronization, In-phase and | **8** |

| | | |
|---|---|---|
| | mid-phase synchronizer. Early late gate synchronizer. Frame synchronization. | |
| **3** | **Different type of line coding:** UPNRZ, UPRZ, PNRZ, PRZ, Manchester, differential encoding and their spectral characteristic, self synchronization properties of some of the encoded signal.<br>**Equalization:** Inter symbol interference (ISI), Purpose of equalization, Eye pattern, Nyquist criterion for zero ISI, fixed equalizer. Design of equalizer, Adaptive equalizer, Decision directed equalizer, Adaptive decision directed equalizer, Partial response signaling. | **10** |
| **4** | **Digital modulation techniques:** BPSK, DPSK. BFSK, MARY-PSK & -FSK, QPSK, MSK principles, QASK, Error calculation.<br>**Spread-spectrum modulation:** Pseudo-Noise Sequence, A notion of Spread Spectrum, Direct-Sequence Spread- Spectrum with Coherent Binary Phase-Shift Keying, Processing Gain, Probability of Error, Frequency-hop Spread Spectrum, Code-Division Multiple Access. | **8** |
| **5** | **Information theory and coding:** Concept and measure of information, Entropy, Discrete and continuous messages, Message source, zero memory sources, extension of zero memory source, Markov source and their entropy, Channel with and without memory, Channel capacity, Hartlay and Shannon's law.<br>**Properties of code:** Uniquely decodable codes, Instantaneous codes, Kraft inequality and Macmillion inequality, Construction of instantaneous codes, Hoffman and Shannon-Fano coding, Error Coding. | **6** |

**Text Books:**

1. S.Haykin, Digital Communications, John Wiley & Sons, 2009.
2. B.Sklar, Digital Communications, 2 nd Edition, Pearson Education, New Delhi, 2009.
3. John G.Proakis, Digital Communications, 3 rd edition, McGraw Hill, 1995.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **HU501** | **Professional Communication** | **L** | **T** |
| | | **3** | **0** |

**Course Overview:**

This course is designed to help one develop communication skills in English with a sense of language. It will be of help to improve clarity, precision and overall impact in both oral as well as written communication. It will also enable one to produce clear and effective scientific and technical documents required for professional communication. We will focus on basic principles of good writing-which scientific and technical writing shares with other forms of writing-and on types of documents common in scientific and technical fields and organizations. One can learn how to gather, organize, and present information effectively according to audience and purpose. Moreover, emphasis will be on sustainable communication that will facilitate an understanding of one's role and help to align with the mission of the organization.

**Objective:**

To provide you with the communication skills one needs to advance in a field, keeping in mind that, in career, one may be involved with design, development, field service and support, management, sales, customer liaison, or all of the above.

**Course Outcomes:**

**CO 1:** Demonstrate effective oral and written communication with diverse audiences and produce variety in professional written documents to better support and communicate.
**CO 2:** Plan and deliver a formal presentation on a topic with confidence and poise.
**CO 3:** Appraise ethics and social responsibility as a professional.
**CO 4:** Apply analytical skills and critical thinking to solve problems and can express using sound logical arguments utilizing the best available resources for communication.
**CO 5:** Exhibit an understanding of multiculturalism and be able to work well in teams.

**Lecture 1-10**

**Introduction to Communication**

Communication and Self Concept
Role of Emotions
Basics of Communication
Purpose of communication- to inform, to express feelings, to imagine, to influence, to meet social expectations and others
Audience analysis- identifying audience to determine the content, language usage and listener expectations for ensuring effective communication
Cross Cultural Communication and Multi Cultural Communication
Effective Communication: Modes/ Models/Networks

LSRW Skills
Non-Verbal Communication

**Barriers to Communication**

Introduction
Intrapersonal and Interpersonal Barriers

Organizational Barriers
Information Gap Principle, Noise, Filters

**Effective Listening and Speaking**

Traits of a good listener
Phonetics – Basic Sounds of English – Word Accent - Intonation Achieving confidence, clarity and fluency as a speaker, paralinguistic features, barriers to speaking, types of speaking, Persuasive Speaking, Public Speaking etc.

**Additional exercises and activities based on developing Listening and Speaking skills**

**Lecture 11-15**

Planning, Outlining and Structuring
Choosing the mode of delivery
Guidelines for effective delivery,
Body Language and Voice, Visual Aids etc.
**Activities and practice on developing Presentation skills**

**Lecture 16-20**

Introduction, Objectives, Types, Samples and Examples
Problem Solving, Networking in English
Meetings and Conferences
Minutes of Meeting, Agenda of Meeting
**Activities and exercise based on developing GD and Business Networking skills in English**

**Lecture 21-30**

Introduction, Audience Recognition, Language, Grammar, Style, Techniques
The Art of Condensation
Note Making and Note Taking
Guidelines and Samples

**Business/Official Communication**

Letters, Resumes, Memos, and e-mails
Rules, formats, Style, Etiquette
Sales and Credit letters
Letter of Enquiry
Letter of Quotation, Order, Claim and Adjustment
Government Letters, Semi- Government Letters to Authorities etc.
Characteristics, Categories, Formats, Structures, Types, Samples
Job Application
Curriculum vitae
Resumes- Chronological, Combination, Functional etc.
Reports and Proposals of different kinds
**Exercise and activities based on developing Writing skills**

**Lecture 31-35**

Right Words and Phrases,
Sentence Patterns
Paragraph
Comprehension Passage etc.

# Vinoba Bhave University , Hazaribagh

| |
|---|
| **Activities and Strategies to engage in active thinking about word meanings, the relationships among words, and use of words in different situations** |
| **Lecture 36-40**<br>Types: Skimming, Scanning, Intensive, Extensive<br>Value Based/Motivational Materials:<br>Articles, Prose, Text Reading<br><br>**Activities and exercise based on developing Reading skills** |
| **Lecture 41-45**<br>Types and Overview<br>Emotional Intelligence<br>Decision Making and Time Management<br>**Activities and exercise based on developing Leadership and Management skills** |

**Recommended Texts:**


1. Raman , Meenakshi and Sangeeta Sharma. *Technical Communication: Principles and Practice*. 2nd ed. OUP India, 2012.
2. Markel, Mike. *Technical Communication*. 7th ed. New York, NY: Bedford/St. Martin's, 2003. ISBN: 9780312403386.
3. Gamble, Teri Kwal and Michael Gamble. *Communication Works.* 9th Ed. New Delhi: Tata- McGraw-Hill, 2010.
4. Hacker, Diana. *A Pocket Style Manual*. 4th ed. New York, NY: Bedford/St. Martin's, 1999. ISBN: 9780312406844.
5. Perelman, Leslie C., James Paradis, and Edward Barrett. *The Mayfield Handbook of Technical and Scientific Writing*. New York, NY: McGraw-Hill, 1997. ISBN: 9781559346474.
6. **David F. Beer and** David McMurrey**, *Guide to Writing as an Engineer*, 2nd ed., Wiley, 2004,** ISBN: 0471430749.
7. Dale Jungk, *Applied Writing for Technicians*, McGraw-Hill, 2005, ISBN 0-07-828357-4.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC511** | **Linear Control System** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | **Analyze electromechanical systems using mathematical modeling**. |
| CO2 | **Determine Transient and Steady State behavior of systems using standard test signals**. |
| CO3 | **Analyze linear and non-linear systems for steady state errors, absolute stability and relative stability.** |
| CO4 | **Design a stable control system satisfying requirements of stability and reduced steady state error.** |

**Detailed Syllabus:**

| Module | Course Content | No. of Lecture |
|---|---|---|
| **1** | **INTRODUCTION:** Concepts of Control Systems- Open Loop and closed loop control systems and their differences, Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback, Mathematical models, Differential equations, Impulse Response and transfer functions. | **7** |
| **2** | **TRANSFER FUNCTION REPRESENTATION:** Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph-Reduction using mason's gain formula. | **6** |
| **3** | **TIME RESPONSE ANALYSIS:** Standard test signals - Time response of first order systems –Characteristic Equation of Feedback control systems, Transient response of second order systems- Time domain specifications– Steady state response-Steady state errors and error constants–Effects of | **10** |

| | | |
|---|---|---|
| | proportional derivative, proportional integral systems.<br>**STABILITY ANALYSIS IN S-DOMAIN:** The concept of stability– Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. | |
| **4** | **ROOT LOCUS TECHNIQUE:** The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.<br>**FREQUENCY RESPONSE ANALYSIS:** Introduction, Frequency domain specifications-Bode diagrams Determination of Frequency domain specifications and Phase margin and Gain margin Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots Stability Analysis. Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers. | **10** |
| **5** | **State Space Analysis of Continuous Systems:** Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability. | **6** |

**Text Books:**


1. Control Systems Theory and Applications - S. K. Bhattacharya, Pearson.
2. B.C. Kuo, Automatic Control Systems, 7th Edition, Prentice Hall of India, 2009.
3. I.J. Nagarath and M. Gopal: Control Systems Engineering, 2nd Edition, New Age Pub. Co. 2008.
4. Modern Control System with Advanced topics- S. K. Bharadwaj and S. K. Nagar, New Age Publication.
5. Control Systems - N. C. Jagan, BS Publications.
6. Control Systems - A. Ananad Kumar, PHI.
7. Control Systems - N. K. Sinha, New Age International (P) Limited Publishers.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC512** | **Radar Engineering** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | **Understand the basic operation of pulse and CW radar systems.** |
| CO2 | **Evaluate the radar performance based on pulse width, peak power and beam width.** |
| CO3 | **Choose suitable tracking radar for a given problem.** |
| CO4 | **Select appropriate criterion for detecting a target.** |
| CO5 | **Understand the working of phased array radars and navigational aids**. |

**Detailed Syllabus:**

| Module | Course Content | No. of Lecture |
|---|---|---|
| **1** | **Radar and Radar Equation:** Introduction, Radar block diagram and operation, frequencies, applications, types of displays, derivation of radar equation, minimum detectable signal, probability of false alarm and threshold detection, radar cross-section, system losses. | **8** |
| **2** | **CW Radar:** Doppler Effect, CW Radar, applications, FM-CW radar, altimeter, Multiple Frequency Radar. Pulse Radar- MTI, Delay Line Canceller, Multiple Frequencies, Range-gated Doppler Filters, Non-coherent MTI, Pulse Doppler Radar. | **8** |
| **3** | **Tracking Radar:** Sequential lobing, conical scanning, mono pulse, phase comparison mono pulse, tracking in range, Comparison of trackers. | **8** |
| **4** | **Detection:** Introduction, Matched Filter, Detection Criteria, Detector characteristics. | **6** |

| | | |
|---|---|---|
| **5** | **Phased Arrays**: Basic concepts, feeds, phase shifters, frequency scan arrays, multiple beams, applications, advantages and limitations. Navigational Aids: Direction Finder, VOR, ILS and Loran. | **10** |

**Text Books:**


1. M.I. Skolnik, Introduction Radar Systems, Second Edition, Mc Graw Hill Book Co., 1981.
2. F.E. Terman, Radio Engineering, Mc Graw Hill Book Co. (for Chapter 7 only), Fourth Edition 1955.
3. Simon Kingsley & Shaun Quegan, Understanding RADAR Systems, McGraw Hill Book Co., 1993.


| **Electronics & Communication Engineering** | | | |
|---|---|---|---|
| **EC513** | **Linear Integrated Circuit** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | Design op-amp circuits to perform arithmetic operations |
| CO2 | Analyze and design linear and non-linear applications using op-amps |
| CO3 | Analyze and design oscillators |
| CO4 | Analyze and design filters |
| CO5 | Understanding of PLL and Timers. |

**Details Syllabus:**

| **Module** | **Course Content** | **No. of Lecture** |
|---|---|---|

| | | |
|---|---|---|
| **1** | Op-Amp equivalent circuits, ideal Op-Amp, Op-Amp DC characteristics, AC characteristics, non-ideal Op-Amp characteristics.<br>DC and AC amplifiers, summing, scaling, and averaging amplifiers, instrumentation amplifiers, I/V, V/I converter, integrator, differentiator, differential amplifiers. Op-amp with negative feedback, voltage series, voltage shunt feedback amplifier. | **8** |
| **2** | Logarithmic Amplifiers, Rectifiers, Peak detection and voltage regulation. | **5** |
| **3** | Comparator and its applications, Schmitt trigger, free-running, one-shot multivibrators, Barkhausen Criterion, sine wave generators, phase-shift, wein-bridge oscillators, square/Triangular/saw tooth wave function generator. | **10** |
| **4** | Filter Classifications, Frequency and Impedance Scaling, First and second order Low Pass and High Pass Designs, Band-Pass Filter, Notch filter. | **8** |
| **5** | PLL and Timers, Voltage controlled Oscillator, Closed loop analysis of PLL, Astable and Monostable Multivibrators using 555 Timer, Voltage regulators-linear and switched mode types. | **8** |

**Text Books:**


1) OP-Amps and Linear Integrated Circuits: - Ramakant Gayakwad (Pearson Education)
2) Linear Integrated Circuits: - D Roy Choudhury, Shail Bala Jain (New Age International Publishers
3) Design with Operational amplifiers and Analog integrated circuits: - Sergio Franco (TATA McGraw-Hill 3rd Edition)


| **Electronics & Communication Engineering** | | | |
|---|---|---|---|
| **EC521** | **Signal and System** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After completion of the course student will be able to:

| | |
|---|---|
| CO1 | **Classify the signals as Continuous time and Discrete time.** |
| CO2 | **Analyze the spectral characteristics of signals using Fourier analysis.** |
| CO3 | **Classify systems based on their properties and determine the response of LTI system using convolution.** |
| CO4 | **Identify system properties based on impulse response and Fourier analysis.** |
| CO5 | **Apply transform techniques to analyze continuous-time and discrete-time signals and systems** also **Comprehensive understanding of control systems, order of systems & stability analysis.** |

**Detailed Syllabus:**

| **Module** | **Course Content** | **No. of Lecture** |
|---|---|---|

# Vinoba Bhave University , Hazaribagh

| | | |
|---|---|---|
| **1** | **SIGNALS AND SYSTEMS:** Continuous Time and Discrete Time signals, Exponential and Sinusoidal Signals, Unit Impulse and Unit Step Functions, Continuous and Discrete Time Systems, basic System Properties. **LINEAR TIME INVARIANT SYSTEMS:** Discrete Time LTI Systems, Continuous Time LTI Systems, properties of LTI Systems, causal LTI Systems Described by Difference equations. | **6** |
| **2** | **FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS:** Response of LTI systems to Complex Exponentials, Fourier series Representation of CT periodic Signals, properties of CT Fourier Series, Fourier Series representation of DT periodic Signals, properties of DFS, Fourier series and LTI Systems, Filtering, Examples of CT filters, Examples of DT filters. CONTINUOUS TIME FOURIER TRANSFORM: Representation of a periodic Signals by continuous FT, FT of periodic signals, convolution and multiplication property of continuous FT, systems characterized by Linear Constant Coefficient Differential Equations. | **9** |
| **3** | **TIME AND FREQUENCY CHARACTERIZATION OF SIGNALS AND SYSTEMS**: Magnitude and phase representation of FT, Magnitude and phase response of LTI systems, Time domain and Frequency domain aspects of ideal and non-ideal filters. **DISCRETE TIME FOURIER TRANSFORM (DTFT) and DISCRETE FOURIER TRANSFORM (DFT):** Properties of DTFT and DFT, convolution property, multiplication property, Duality, Systems characterized by Linear Constant Coefficient Difference Equations. | **9** |
| **4** | **SAMPLING:** Sampling theorem, Impulse sampling, sampling with zero order Hold, Reconstruction of signal from its samples using interpolation, Effect of under sampling **Z-TRANSFORM:** Z-transform, Region of convergence and its properties, Inverse Z transform, properties of ZT, Analysis and characterization of LTI systems using ZT, LTI Systems, System function algebra and block diagram representations. | **9** |

| | | |
|---|---|---|
| **5** | **SIGNAL FLOWGRAPHS:** Impulse Response and Transfer function of linear Systems, Block diagrams, Signal flow graphs, Basic properties of SFG, SFG Terms, SFG Algebra, Gain formula, Application of gain formula to block diagrams. | **7** |

**Text Books:**


1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, Signals and Systems Prentice Hall India, 2nd Edition, 2009.
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms, and Applications, 4th Edition, PHI, 2007.
3. Robert A. Gable, Richard A. Roberts, Signals & Linear Systems, 3rd Edition, John Wiley,1995.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC522** | **Digital Switching and Multiplexing** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After completion of the course student will be able to:

| | |
|---|---|
| CO1 | Understand the characteristics of telephone systems. |
| CO2 | Design and test telecom switching systems. |
| CO3 | Model and estimate the telecom traffic. |
| CO4 | Understand the network synchronization and management. |
| CO5 | Evaluate fiber based wide area networks. |

**Detailed Syllabus:**

| Module | Course Content | No. of Lecture |
|---|---|---|
| **1** | **Introduction:** Evolution of Telecommunication, Basics of switching system, step-by-step switching, Design considerations. Principles of Crossbar switching, electronic space division switching, stored program control, software architecture, switching functions. | **8** |
| **2** | **Digital transmission:** Frequency Division multiplexing, Time Division multiplexing, Statistical Division Multiplexing, switching hierarchy, Synchronous digital hierarchy both USA and European standards.<br>**Message switching:** circuit switching & packet switching, space division switching, Time division switching. Two dimensional switching, grade of service, non-blocking, digital cross connect, concentrators, expanders and distributors, two stage networks, three stage networks, n-stage networks. | **10** |
| **3** | **Time Division Switching:** Time Division space switching, Time division time switching, and time multiplexed space switching. Time multiplexed time switching, space – time combination switching, three stage combination switching, N-stage combination switching, signaling techniques. | **6** |
| **4** | **Telecommunication Traffic:** Units of Traffic, Network traffic load and parameters, Grade of service and Blocking Probability, traffic measurement, Mathematical model, Incoming traffic and service time characteristics, Blocking models and loss estimates, delay systems. | **8** |

| | | |
|---|---|---|
| | Digital Subscriber access – ISDN, High data rate digital subscriber loops, Digital Loop carrier systems, fiber in the loop, voice band modems, digital satellite services, Broadband switching systems. | |
| **5** | **Network synchronization:** Control and management, timing, timing inaccuracies, network synchronization, network control and management. **SONET/SDH:** SONET multiplexing overview, frame formats, operation, administration and maintenance, frequency justification and payload framing, virtual tributes, DS3 payload mapping, E4 payload mapping, SONET optical standards, SONET rings & networks. | **8** |

**Text Books:**


1. Digital Telephony,John C Bellamy,3/e,Wiley-India,1999
2. Telecommunication Switching Systems and Networks,T Viswanathan,PHI,1997
3. "Performance Modeling, Loss Networks, and Statistical Multiplexing (Synthesis Lectures on Communication Networks)" by Ravi Mazumdar and Jean Walrand.
4. "Broadband Communications: Convergence of Network Technologies (IFIP Advances in Information and Communication Technology)" by Danny H K Tsang and Paul J Kühn.
5. "Basics of Computer Networking (SpringerBriefs in Electrical and Computer Engineering)" by Thomas Robertazzi.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC523** | **Biosensors** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | **Understand bio sensing and transducing techniques.** |
| CO2 | **Understand principles of linking cell components and biological pathways with energy transduction, sensing and detection.** |
| CO3 | **Demonstrate appreciation for the technical limits of performance of biosensor.** |
| CO4 | **Apply principles of engineering to develop bio analytical devices and design of biosensors.** |

**Detailed Syllabus:**

| Module | Course Content | No. of Lecture |
|---|---|---|
| **1** | **General principles:** A historical perspective, Signal transduction, Physico-chemical and biological transducers, Sensor types and technologies, Definitions and Concepts Terminology and working vocabulary, Main technical definitions, calibration, selectivity, sensitivity, reproducibility, detection limits, response time. | **8** |
| **2** | **Physico-chemical transducers:** Electrochemical transducers (amperometric, potentiometric, conductimetric), optical transducers (absorption, fluorescence, SPR), Thermal transducers, piezoelectric transducers. | **5** |
| **3** | **Bio recognition systems: Enzymes:** Oligonucleotides and Nucleic Acids, Lipids (Langmuir-Blodgett bilayers, Phospholipids, Liposomes), Membrane receptors and transporters, Tissue and organelles (animal and plant tissue), Cell culture, Immuno receptors, Chemoreceptors, Limitations & problems, Immobilization of biomolecules. | **10** |

| | | |
|---|---|---|
| **4** | **Biosensor Engineering:** Methods for biosensors fabrication, self-assembled monolayers, screen printing, photolithography, micro-contact printing, MEMS, Engineering concepts for mass production. | **8** |
| **5** | **Application of modern sensor technologies:** Clinical chemistry, Test-strips for glucose monitoring, Urea determination; Implantable sensors for long-term monitoring, Environmental monitoring, Technological process control, Food quality control, Forensic science benefits, Problems & limitations. | **8** |

**Text Books:**


1. Donald G. Buerk, Biosensors: Theory and Applications, First Edition, CRC Press, 2009.
2. Alice Cunningham, Introduction to Bioanalytical Sensors, John Wiley& Sons, 1998.
3. Brian R. Eggins, Chemical Sensors and Biosensors, John Wiley& Sons, 2003.


| **Electronics & Communication Engineering** | | | |
|---|---|---|---|
| **EC531** | **Electronics Instrumentation** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After completion of the course student will be able to:

| | |
|---|---|
| CO1 | Apply knowledge of instruments for effective use |
| CO2 | Select suitable instruments for typical measurements |
| CO3 | Identify various transducers to measure strain, temperature and displacement |
| CO4 | Understand data acquisition system and general purpose interfacing bus |

**Detailed Syllabus:**

| **Module** | **Course Content** | **No. of Lecture** |
|---|---|---|
| **1** | **Measurement And Error:** Sensitivity, Resolution, Accuracy and Precision, Absolute and Relative types of errors, Statistical analysis, Probability of Limiting errors, Linearity. | **8** |
| **2** | **Instruments:** Current and Resistance in instruments, Analog and Digital Multimeters, Measurement of time and frequency, Digital Frequency Meter and applications. | **7** |

| | | |
|---|---|---|
| **3** | **Impedance Measurement:** Kelvin Bridge, Megger, Maxwell, Hay and Shering Bridges. Q-meter, Noise and Interference reduction techniques in Measurement Systems, Wave Analyzer, Spectrum Analyzer, FFT Analyzer, Oscilloscopes, Pulse Measurements, Delayed Time Base, Analog Storage, Sampling and Digital Storage Oscilloscopes. | **10** |
| **4** | **Transducers:** Classification and selection of Transducers, Introduction to Strain, Load, Force, Displacement, Velocity, Acceleration, Pressure and Temperature Measurements, Introduction to Smart sensors and MEMS. | **7** |
| **5** | **Introduction to Data Acquisition Systems (DAS):** Block Diagram, Specifications and various components of DAS, applications of DAS in various fields. General purpose **Instrumentation Bus (GP-IB):** Protocol, SCPI Commands and Applications to DSO and DMM. | **8** |

**Text Books:**

1. Helfrick& Cooper-Modern Electronic Measurement & Instrumentation.
2. Golding, E.W.- Electrical Measurement and Measuring Instruments.
3. H.S Kalsi- Electronic Instrumentation.

| **Electronics & Communication Engineering** | | | |
|---|---|---|---|
| **EC532** | **Digital System Design*** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | **Design of combinational and sequential logic circuits and develop Verilog models**. |
| CO2 | **Understand characteristics of the TTL/CMOS logic families and realize Boolean equation using CMOS logic**. |
| CO3 | **understand fault detection techniques for digital logic circuits** |
| CO4 | **understand SRAM/DRAM organization and periphery circuitry, operation of SRAM cell, DRAM cell, DDR2/DDR4 and SD card**. |

**Detailed Syllabus:**

# Vinoba Bhave University , Hazaribagh

| Module | Course Content | No. of Lecture |
|---|---|---|
| 1 | **INTRODUCTION:** Introduction to Number Systems and Boolean Algebra Digital and Analog Basic Concepts, Number Base Conversion - Complement Codes, Binary Arithmetic , Binary codes: BCD, Weighted codes -2421, 8421, gray code - Binary Logic functions, Boolean Algebra, Theorems and Properties of Boolean Algebra. **MINIMIZATION OF BOOLEAN FUNCTION:** Minimization techniques in digital Logic Canonical forms, Generation of Switching Equations from Truth Table - K-map(Karnaugh map) 2 ,3 and 4 variables, K map with Don't care terms - Quine Mc-Cluskey minimization technique, Quine Mc-Cluskey using Don't Care Terms - Mixed logic Combinational circuits. | **8** |
| 2 | **COMBINATIONAL CIRCUIT DESIGN:** Design with basic logic gates, comparators, data selectors, priority encoders, decoders, full adder, serial binary adder, parallel binary adders-ripple-carry adder, carrylook ahead adder; Parallel prefix adders- Carry select Adder, Conditional sum adder, Kogge-stone Adder, Brent-kung adder, Verilog models. | **8** |
| 3 | **SEQUENTIAL CIRCUIT DESIGN:** Memory elements and their excitation functions SR, JK, T, and D latches and flip-flops, master slave JK flip-flop, edge-triggered flip-flop, synchronous and asynchronous counters, finite-state machine, sequence detector, minimization and transformation of sequential machines, Registers, Verilog models. | **10** |
| 4 | **TESTING OF COMBINATIONAL CIRCUITS:** Fault models, structural testing: path sensitization Logic families: TTL and CMOS Logic circuits, Transfer characteristics, fan-in, fan-out, noise margin, rise time and fall time analysis, realization of Boolean equations using CMOS logic. | **8** |
| 5 | **MEMORY:** Types of memories, MOS SRAM cells, DRAM, SDRAM, DDR SDRAM, DDR2 SDRAM, DDR4 SDRAM, organization of a SRAM, Organization of SDRAM, Periphery circuitry of Memory, Flash memory, SD card. | **6** |

**Text Books:**


1. William J. Dally and John W. Poulton, Digital Systems Engineering, Cambridge University Press, 2008.
2. Schilling, Herbert Taub and Donald, Digital Integrated Electronics, Tata McGraw-Hill, 2008.
3. Jayaram Bhasker, Verilog Primer, 3rd edition, Prentice-Hall India, 1998.
4. Sameer Palnitkar, Verilog HDL: A guide to digital Design and Synthesis, 2nd edition, Pearson, 2003.

5. John F Wakerly, Digital Design Principles and Practices, 3rd Edition, Prentice Hall India, 2001.

Franklin P. Processor, David E. Winkel, The Art of Digital Design: An Introduction to Top Down Design, 2nd Edition, PTR Prentice Hall, 1987.

# Vinoba Bhave University , Hazaribagh

| Electronics & Communication Engineering | | | |
|---|---|---|---|
| **EC533** | **Materials for Engineering Applications** | **L** | **T** |
| | | **3** | **0** |

**Course Outcomes:** After the completion of the course the student will be able to:

| | |
|---|---|
| CO1 | **Correlate processing, microstructure and properties of materials**. |
| CO2 | **Understand behaviour of materials under various conditions**. |
| CO3 | **Characterize modes of failure of engineering materials and design new materials with better properties and cost effective processes.** |
| CO4 | **Identify suitable materials for engineering applications.** |

**Detailed Syllabus:**

| Module | Content | No. of Lectures |
|---|---|---|
| **1** | **Structure of solids**: Classification of engineering materials, Structure-property relationship in engineering materials, Crystalline and non-crystalline materials, Miller Indices, Crystal planes and directions, Determination of crystal structure using X-rays, Inorganic solids, Silicate structures and their applications. Defects; Point, line and surface defects. | **6** |
| **2** | **Mechanical properties of materials**: Elastic, Anelastic and Viscoelastic behaviour, Engineering stress and engineering strain relationship, True stress, true strain relationship, review of mechanical properties, Plastic deformation by twinning and slip, Movement of dislocations, Critical shear stress, Strengthening mechanism, and Creep. | **10** |
| **3** | **Equilibrium diagram**: Solids solutions and alloys, Gibbs phase rule, Unary and binary eutectic phase diagram, Examples and applications of phase diagrams like Iron - Iron carbide phase diagram. | **10** |

| | | |
|---|---|---|
| **4** | **Electrical and magnetic materials**: Conducting and resistor materials, and their engineering application; Semiconducting materials, their properties and applications, Magnetic materials, Soft and hard magnetic materials and applications, Superconductors, Dielectric materials, their properties and applications. Smart materials: Sensors and actuators, piezoelectric, magnetostrictive and electrostrictive materials. | **8** |
| **5** | **Corrosion process**: Corrosion, Cause of corrosion, Types of corrosion, Protection against corrosion.<br>**Materials selection**: Overview of properties of engineering materials, Selection of materials for different engineering applications. | **6** |

**Text Books:**

1. M.F. Ashby: Engineering Materials, 4th Edition, Elsevier, 2005.
2. M.F. Ashby: Materials Selection in Mechanical Design, B H, 2005.
3. ASM Publication Vol. 20, Materials Selection and Design, ASM, 1997
4. Pat L. Mangonon: The Principles of Materials Selection and Design, PHI, 1999