# *Faculty of Engineering & Technology*

# *P.K.University*

# *Shivpuri (MP)*


## Department of Electronics & Communication Engineering

## Evaluation Scheme & Syllabus

## B.Tech. Second Year

## (V & VI Sem)

## (Effective from session 2025-26)

# EVALUATION SCHEME

## B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

3rd Year (5th Semester)

| Study And Evaluation Scheme For B.Tech. Electronics & Communication Engineering | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year- 3rd /Semester -5th | | | | | | | | | | | | | |
| Subject Code | Subjects Name | Study Scheme Periods/ Week | | | Credits | Marks in Evaluation Scheme | | | | | | Total Marks of Internal & External | |
| | | | | | | Internal Assessment | | | External Assessment | | | | |
| | | L | T | P | | Th | Pr | Total Internal | Th | Pr | Total External | Grand Total | |
| UMANAEC 501 | Managerial Economics | 4 | 0 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 | |
| UINTEEC 502 | Integrated Circuits | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 | |
| UINDUEC 503 | Industrial Sociology | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 | |
| UPRINEC 504 | Principles of Communication | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 | |
| UDIGIEC 505 | Digital Signal Processing | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 | |
| UANTEEC 506 | Antenna and Wave Propagation | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 | |
| UINTEEC 507 | Integrated Circuits Lab | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 | |
| UPRINEC508 | Principles of Communication lab | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 | |
| UDIGIEC 509 | Digital Signal Processing Lab | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 | |
| UCADOEC 510 | CAD of Electronics Lab | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 | |
| Total | | 19 | 0 | 6 | 23 | 180 | 100 | 280 | 420 | 100 | 520 | 800 | |
| For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate. | | | | | | | | | | | | | 400 |

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-V*

### UMANAEC501
### MANAGERIAL ECONOMICS

**(L-T-P-4-0-0)**

**Unit- I : Introduction of Engineering Economics and Demand Analysis**: Meaning and nature of Economics, Relation between science, engineering, technology and economics; Meaning of Demand, Determinants of Demand, Shifts in demand, Law of Demand, Price Elasticity of Demand &Types, Income Elasticity, Cross price Elasticity, Determinants of Elasticity, uses and importance

**Unit- III: Cost Analysis**- Introduction, Types of Costs, Cost-Output Relationship: Cost Function, Cost-Output Relationships in the Short Run, and Cost-Output Relationships in the Long Run; Short run and long run, Break- Even Analysis; Production functions: laws of variable proportions, law of returns; Economies of scale: Internal and external.

**Unit- IV:** Market Structure: Market Structure Perfect Competition, Imperfect competition – Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.

**Unit V :** Nature and characteristics of Indian economy, concepts of LPG, elementary concepts of National Income, Inflation and Business Cycles ,Concept of N.I. and Measurement., Meaning of Inflation, Types and causes , Phases of business cycle .Investment decisions for boosting economy(National income and per capital income)

**References:**


1. Premvir Kapoor, Sociology and Economics for Engineers, Khanna Publishing House (Edition 2018)
2. Salvatore D, ―Principles of Microeconomics‖, Oxford University Press.
3. Koutsoyiannis A, ―Modern Microeconomic‖, Macmillan Education Ltd.
4. Dwivedi DN, ―Principles of Microeconomics‖, Pearson Education.
5. Cowell, FA, ―Microeconomic Principles and Analysis‖, Oxford University Press.

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

### UINTEEC502
### INTEGRATED CIRCUITS

**(L-T-P-3-0-0)**

**Unit- I:** Analog Integrated circuit Design: an overview: Current Mirrors using BJT And MOSFETs, Simple current Mirror, Base current compensated current Mirror, Wilson and Improved Wilson Current Mirrors, Widlar Current source and Cascode current Mirror The 741 IC Op-Amp: Bias circuit, short circuit protection circuitry, the input stage, the second stage, the output stage, and device parameters; DC Analysis of 741: Small Signal Analysis of input stage, the second stage, the output stage; Gain, Frequency Response of 741; a Simplified Model, SlewRate, Relationship Between ft and SR

**Unit- II : Linear Applications of IC op-amps:** An Overview of Op-Amp (ideal and non-ideal) based Circuits V-I and I-V converters, generalized Impedance converter, simulation of inductors.

**Filters:** First and second order LP, HP, BP BS and All pass active filters, KHN.

**Unit- III: Digital Integrated Circuit Design- An Overview**: CMOS Logic Gate Circuits**:** Basic Structure CMOS realization of Inverters, AND, OR, NAND and NOR Gates
**Latches and Flip flops:** The Latch, The SR Flip-flop, CMOS Implementation of SR Flip- flops, A Simpler CMOS Implementation of the Clocked SR Flip-flop, D Flip- flop Circuits.

**Unit-IV : Non-Linear applications of IC Op-amps:** Log–Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Simple and Hold Circuits, Analog Multipliers and their applications.Op- amp as a comparator, Zero crossing detector, Schmitt Trigger, Astable multi vibrator, Mono stable multi vibrator, Generation of Triangular Waveforms D/A and A/D converters Integrated Circuit Timer:

The 555 Circuit, Implementing a Mono stable Multi-vibrator Using the 555 IC, Astable Multi vibrator Using the 555 IC. Phase locked loops (PLL): Ex-OR Gates and multipliers as phase detectors, Block

Diagram of IC PLL, Working of PLL and Applications of PLL.

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

### UINDUEC503

### INDUSTRIAL SOCIOLOGY

**(L-T-P-3-0-0)**

**Unit- I:** Industrial Sociology: Nature, Scope and Importance of Industrial Sociology. Social Relations in Industry, Social Organisation in Industry- Bureaucracy, Scientific Management and Human Relations.

**Unit- II:** Rise and Development of Industry: Early Industrialism – Types of Productive Systems – The Manorial or Feudal system. The Guild system, The domestic or putting-out system, and the Factory system. Characteristics of the factory system. Causes and Consequences of industrialization. Obstacles to and Limitations of Industrialization.

**Unit- III:** Industrialization in India. Industrial Policy Resolutions – 1956.Science. Technology and Innovation Policy of India 2013.

**Unit- IV:** Contemporary Issues: Grievances and Grievance handling Procedure. Industrial Disputes: causes, Strikes and Lockouts. Preventive Machinery of Industrial Disputes: Schemes of Workers Participation in Management- Works Committee, Collective Bargaining, Bi-partite & Tri-partite Agreement, Code of Discipline, Standing Orders. Labour courts & Industrial Tribunals.

**Unit-V:** Visualizing the future: Models of industrialization- Collectivist, anarchist, free market, environmentalist, etc. Cultural issues, consumer society and sociological concerns.

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-V*

### UPRINEC504
### PRINCIPLES OF COMMUNICATION

**(L-T-P-3-0-0)**

**Unit-I:** Introduction: Overview of Communication system, Communication channels, Need for modulation, Baseband and Pass band signals, Modulation: Double Amplitude sideband with Carrier (DSB-C), Double side band without Carrier DSB-SC, Single Side Band Modulation SSB, Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator, Radio Transmitter and Receiver.

**Unit-II:** Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM Signal, Bandwidth of FM Signals using Bessel's functions FM modulators and demodulator approximately

Compatible SSB system, Stereophonic FM Broadcasting.

**Unit-III:** Pulse Modulation, Digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse and digita postion Modulation, Their generation Demodulation, 1 Representation of Analog Signals Pulse Code Modulation (PCM), PCM System Issues in digital transmission: Frequency Division Multiplexing Time Division Multiplexing, T1

Digital System, TDM Hierarchy.

**Unit-IV:** Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Voice Coders, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Linear filtering of Noises, Mathematical Representation of Noise.

**Text Book:**

1. Herbert Taub and Donald L. Schilling, ―Principles of Communication Systems‖, Tata McGraw Hill.
2. Rishabh Anand, Communication Systems, Khanna Publishing House, Delhi

**Reference Books:**

1. B.P.Lathi,―ModernDigitalandAnalogcommunicationSystems‖,3rd Edition, Oxford University Press.

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

### UDIGIEC505

### DIGITAL SIGNAL PROCESSING

**(L-T-P-3-0-0)**

**Unit-I:** Realization of Digital Systems: Introduction, direct form realization of IIR systems, cascade realization of an IIR systems, parallel form realization of an IIR systems, Ladder structures: continued fraction expansion of H (z), example of continued fraction, realization of a ladder structure, example of a ladder realization, FIR Filter Realization: Direct & Cascade, FIR Linear Phase Realization.

**Unit-II:** Design of Infinite Impulse Response Digital Filters: Introduction to Filters, Impulse Invariant Transformation, Bi-Linear Transformation, All- Pole Analog Filters: Butterworth and Chebyshev, Design of Digital Butterworth and Chebyshev Filters, Frequency Transformations

**Unit-III:** The Kaiser Window, Finite Word length effects in digital filters. Finite Impulse Response Filter Design: Windowing and the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows,

**Unit-IV:** DFT & FFT: Definitions, Properties of the DFT, Circular Convolution, Linear Convolution using Circular Convolution, Decimation in Time (DIT) Algorithm, Decimation in Frequency (DIF) Algorithm.

**Unit-V:** Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion: Single and Multistage, SubbandCoding of Speech signals, Quadrature mirror filters.

**Text Book:**


1. Johnny R. Johnson, .Digital Signal Processing., PHI Learning Pvt Ltd., 2009.


**Reference Books:**


1. John G Prokias, Dimitris G Manolakis, .Digital Signal Processing. Pearson Education.
2. Oppenheim & Schafer, . Digital Signal Processing. PHI

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-V*

### UANTEEC506
### ANTENNA AND WAVE PROPAGATION

**(L-T-P-3-0-0)**

**Unit-I:** Antennas Basics: Introduction, Basic Antenna Parameters, Patterns, Beam Area (or Beam Solid Angle) ΩA, Radiation Intensity, Beam Efficiency, Directivity D and Gain G, Directivity and Resolution, Antenna Apertures, Effective Height, The radioCommunication link, Fields from Oscillating Dipole, Single-to-Noise Ratio(SNR), Antenna Temperature, Antenna Impedance.

**Unit-II:** Application to an Isotropic Source, Radiation Intensity, Arrays of Two Isotropic Point Sources, Non-isotropic but Similar Point Sources and the Principle of Pattern Multiplication, Pattern Synthesis by Pattern Multiplication, Linear Arrays of n Isotropic Point Sources of Equal Amplitude and Spacing, Linear Broadside Arrays with Non-uniform Amplitude Distributions. General Considerations.

**Unit-III:** Electric Dipoles, Thin Liner Antennas and Arrays of Dipoles and Apertures: The Short Electric Dipole, The Fields of a Short Dipole, Radiation Resistance of Short Electric Dipole, Thin Linear Antenna, Radiation Resistance of λ/2 Antenna, Array of Two Driven λ/2 Elements: Broadside Case and End-Fire Case, Horizontal Antennas Above a Plane Ground, Vertical Antennas Above a Plane Ground, Yagi-Uda Antenna Design, Long- Wire Antennas, folded Dipole Antennas.

**Unit-IV:** The Loop Antenna: Design and its Characteristic Properties, Application of Loop Antennas, Far Field Patterns of Circular Loop Antennas with Uniform Current, Slot Antennas, Horn Antennas, Helical Antennas, The Log-Periodic Antenna, Micro strip Antennas. Reflector Antennas: Flat Sheet Reflectors, Corner Reflectors, The Parabola-General Properties, A Comparison Between Parabolic and Corner Reflectors, The Paraboloidal Reflector, Patterns of Large Circular Apertures with Uniform Illumination, Reflector Types (summarized), Feed Methods for Parabolic Reflectors.

**Unit-V:** Ground Wave Propagation: Plane Earth Reflection, Space Wave and Surface Wave.Space Wave Propagation: Introduction, Field Strength Relation, Effects of ImperfectEarth, Effects of Curvature of Earth.Sky wave Propagation**:** Introduction structural Details of the ionosphere, Wave Propagation Mechanism, Refraction and Reflection of Sky Waves by ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation Between MUF and the Skip Distance, Multi-Hop Propagation, Wave Characteristics


1. John D Krauss, Ronald J Marhefka and Ahmad S. Khan, ―Antennas and Wave Propagation‖, Fourth Edition, Tata McGraw Hill.

**Reference Books:**

1. A. R. Harish, M. Sachidananda, ―Antennas and Wave Propogation‖, Oxford University Press.
2. Edward Conrad Jordan and Keith George Balmain, ―Electromagnetic Waves and Radiating Systems‖, PHI.
3. R.L. Yadava, Electromagnetic Waves, Khanna Publishing House, Delhi.
4. A. Das, Sisir K. Das, ―Microwave Engineering‖, Tata McGraw Hill.

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

## UINTEEC507

## INTEGRATED CIRCUIT LAB

**(L-T-P-0-0-2)**

**Objective: -** To design and implement the circuits to gain knowledge on performance of thecircuit and its application. These circuits should also be simulated on Pspice and implemented using TL082, LM741, NE555, ASLK, MPY634 KP connecting wires, Power Supply, function generator and oscilloscope.

1. Design and test a function generator that can generate square wave and triangular wave output for a given frequency and cascade a multiplier MPY634KP in feedback loop to form VCO
2. Voltage to current and current to voltage convertors.
3. Second order filters using operational amplifier in universal active filter topology for-
   - **a)** Low pass filter of specified cut off frequency.
   - **b)** High pass filter of specified frequency.
   - **c)** Band pass filter with unit gain of specified pass band
   - **d)** Design a notch filter to eliminate 50Hz power line frequency.
4. Wien bridge oscillator using operational amplifier.
5. Astable and mono-stable multivibrators using IC 555.
6. Design the following amplifiers:
   - **a)** A unity gain amplifier.
   - **b)** A non-inverting amplifier with a gain of —A‖.
   - **c)** An inverting amplifier with a gain of —A‖.
   - **d)** Log and antilog amplifiers.
   - **e)** Voltage comparator and zero crossing detectors.
7. Design and test a PLL to get locked to a given frequency „f‟. Measure the locking range of the system and also measure the change in phase of the output signal as input frequency is varied within the lock range.
8. Design and test the integrator for a given time constant. Design and test a high-Q Band pass self-tuned filter for a given center frequency.
9. Design and test an AGC system for a given peak amplitude of sine-wave output.
10. Design and test a Low Dropout regulator using op-amps for a given voltage regulation characteristic and compare the characteristics with TPS7250IC.
11. Design of a switched mode power supply that can provide a regulated output voltage for a given input range using the TPS40200 IC.

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

### UPRINEC508
### PRINCIPLES OF COMMUNICATION LAB

**(L-T-P-0-0-2)**

**List of Experiments**

1. To study DSB/ SSB amplitude modulation & determine its modulation factor & power in side bands.
2. To study amplitude demodulation by linear diode detector.
3. To study frequency modulation and determine its modulation factor.
4. To study PLL 565 as frequency demodulator.
5. To study sampling and reconstruction of Pulse Amplitude modulation system.
6. To study the Sensitivity, Selectivity, and Fidelity characteristics of super heterodyne receiver.
7. To study Pulse Amplitude Modulation.
   a) using switching method
   b) by sample and hold circuit
8. To demodulate the obtained PAM signal by 2nd order LPF.
9. To study Pulse Width Modulation and Pulse Position Modulation.
10. To study Pulse code modulation and demodulation technique.
11. To study Delta modulation and demodulation technique.
12. Design and implement an FM radio receiver in 88-108 MHz

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

## UDIGIEC509

## DIGITAL SIGNAL PROCESSING LAB

**(L-T-P-0-0-2)**

**List of Experiments**

1. To study about DSP Processors and architecture of TMS320C6713 DSP processor.
2. Introduction to MATLAB and Code Composer Studio or its equivalent open source software.

   OR

3. Write a Program for the generation of basic signals such as unit impulse, unit step, ramp, exponential, sinusoidal and cosine.
4. To study matrix multiplication using code composer studio.
5. Evaluate 4 point DFT of and IDFT of $x(n) = 1, 0 \leq n \leq 3; 0$ elsewhere.
6. To implement FFT algorithm.
7. Verify Blackman and Hamming windowing techniques.
8. Implement IIR Butterworth analog Low Pass for a 4 KHz cut off frequency.
9. Verify Circular Convolution using code composer studio.
10. Verify Linear convolution of two sequence using code composer studio.
11. To implement Tone Generation.
12. To implement floating point arithmetic.

**Spoken Tutorial (MOOCs):**

Spoken Tutorial MOOCs, ' Course on Scilab', IIT Bombay (http://spoken-tutorial.org/)

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-V*

**UCADOEC510**

**CAD OF ELECTRONICS LAB – I**

**(L-T-P-0-0-2)**

**PSPICE Experiments**

1. (a)Transient Analysis of BJT inverter using step input.

   (b)DC Analysis (VTC) of BJT inverter with and without parameters.

2. (a)Transient Analysis of NMOS inverter using step

   input. (b)Transient Analysis of NMOS inverter using

   pulse input.

   (c)DC Analysis (VTC) of NMOS inverter with and without parameters.

3. (a) Analysis of CMOS inverter using step input.

   (b)Transient Analysis of CMOS inverter using step input with parameters.

   (c)Transient Analysis of CMOS inverter using pulse input.

   (d)Transient Analysis of CMOS inverter using pulse input with parameters.

   (e)DC Analysis (VTC) of CMOS inverter with and without parameters.

4. Transient &DC Analysis of NOR Gate inverter.
5. Transient & DC Analysis of NAND Gate.
6. Design and Simulation of a Differential Amplifier (with Resistive Load, Current Source Biasing)
7. Analysis of frequency response of Common Source amplifiers.
8. Analysis of frequency response of Source Follower amplifiers.
9. Analysis of frequency response of Cascode amplifiers.
10. Analysis of frequency response of Differential amplifiers.

## Study And Evaluation Scheme For B.Tech.
## Electronics & Communication Engineering

**Year- 3rd /Semester -6th**

| Subject Code | Subjects Name | Study Scheme Periods/ Week | | | Credits | Marks in Evaluation Scheme | | | | | | Total Marks of Internal & External |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Internal Assessment | | | External Assessment | | | |
| | | L | T | P | | Th | Pr | Total Internal | Th | Pr | Total External | Grand Total |
| UINDUEC601 | Industrial Management | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| UMICREC602 | Microwave Engineering | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UDIGIEC603 | Digital Communication | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| UINDUEC604 | Industrial Electronics | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UCONTEC605 | Control System-I | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| UMICREC606 | Microwave Engineering-Lab | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| UCOMMEC607 | Communication Lab-II | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| UCONTEC608 | Control System Lab-I | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| UMICREC609 | Microcontrollers For Embedded Systems -Lab | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| **Total** | | 15 | 2 | 8 | 21 | 150 | 100 | 250 | 350 | 100 | 450 | 700 |

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-VI*

**UINDUEC601**
**INDUSTRIAL MANAGEMENT**

**(L-T-P-3-0-0)**

**Unit-: Introduction:** Concept and scope of Industrial Management. Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.

**Unit-II: Functions of Management,** Taylor's Scientific Management Theory, Fayol's Principles of Management, Social responsibilities of Management,

Introduction to Human resources management: Nature of HRM, functions and importance of HRM.

**Unit-III: Work Study:** Introduction, definition, objectives, steps in work study, Method study: definition, objectives, steps of method study, Work Measurement: purpose, types of study — stop watch methods — steps — allowances — standard time calculations — work sampling, Production Planning and Control

Inventory Control: Inventory, Cost, Models of inventory control: EOQ, ABC, VED

**Unit-IV: Quality Control**: statistical quality control, Control charts for variables and attributes, Acceptance Sampling- Single sampling- Double sampling plans, Introduction to TQM.

**Unit-V: Project Management**: Project network analysis, CPM, PERT and Project crashing and resource Leveling

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-VI*

### UMICREC602
### MICROWAVE ENGINEERING

**(L-T-P-3-1-0)**

**Unit-I: Rectangular & circular wave guides:**

Introduction to microwave communication and EM spectrum, Rectangular wave guide: Field Components, TE, TM Modes, Dominant TE10 mode, Field Distribution, Power, Attenuation. Circular waveguides: TE, TM modes. Wave velocities, Microstrip transmission line (TL), Coupled TL, Strip TL Coupled strip line, Coplanar TL, Microwave cavities.

**Unit-II: Passive microwave devices:** Scattering matrix, Passive microwave devices: Microwave hybrid circuits, Terminations, Attenuators, Phase Shifters, Directional couplers: Two-hole directional couplers, S- Matrix of a directional coupler, Hybrid couplers, Microwave propagation in ferrites, Faraday rotation, Isolators, Circulators. S-parameter analysis of all components.

**Unit-III:** Microwave tubes :Microwave tubes: Limitations of conventional active devices at microwave frequency, Two cavity Klystron, Reflex Klystron, Magnetron, Traveling wave tube, Backward wave oscillators, Gyro Devices: Their schematic, Principle of operation, Performance characteristic and their application.

**Unit-IV: Solid state amplifiers and oscillators:** Transferred electron devices: Gunn- effect diodes & modes of operation. Avalanche transit – time devices: IMPATT diode, TRAPPAT diode, BARITT diode.

**Unit-V: Microwave Measurements:** VSWR meter, Frequency meter, Spectrum analyser, Network analyser,Tunable detector, Slotted line carriage, Power meter, Microwave power measurement Insertion loss and attenuation measurement, VSWR measurement, Return loss measurement by a reflectometer, Frequency measurement, measurement of cavity Q, Dielectric constant measurement of a solid, EM radiation & measurement.

**Text Books:**


1. G. S. Raghuvanshi, Microwave Engineering; Cengage
2. S.Y. Liao, Microwave Devices & Circuits; PHI 3rd Ed.


**Reference Books:**


1. A Das and S.K. Das, Microwave Engineering; McGraw Hill Education
2. S. Vasuki, D Margaret Helena, R Rajeswari, Microwave Engineering; MHE
3. M.I. Skolnik, Introduction to Radar Engineering ; TMH

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-VI*

### UDIGIEC603
### DIGITAL COMMUNICATION

**(L-T-P-3-0-0)**

**Unit I:** Principles of digital data transmission: Digital Data transmission, Line coding review, Pulse Digital receivers, Eye Digital carrier system. Method shaping, Scrambling, diagram, of generation and detection of coherent & non-coherent binary ASK, FSK & PSK, Differential phase shift keying, Quadrature modulation techniques. (QPSK and MSK), M-ary Digital carrier Modulation.

**Unit-II:** Fundamentals of probability theory & random process : Concept of Probability, Random variable, statistical average, correlation, sum of central limit Theorem, Random Process classification of Random Processes Power spectral density, Multiple random processes.

**Unit-III:** Performance Analysis of Digital communication system: Optimum linear Detector for Binary polar signaling, General Binary Signaling, Coherent Receivers for Digital Carrier Modulations, Signal Space Analysis of Optimum Detection, Vector Decomposition of white noise Random processes, general Expression for Probability of optimum receivers.

**Unit-IV:** Spread spectrum Communications: Frequency Hopping Spread Spectrum(FHSS) systems, Direct Sequence Spread Spectrum, Code Division Multiple Access of DSSS, Multiuser Detection, OFDM Communications Introduction to information theory: Measure of Information, Source Encoding, Error Free

Communication over a Noisy Channel. Capacity of a discrete and Continuous Memory less

channel.

**Unit-V**: Error Correcting codes: Hamming sphere, hamming distance and Hamming bound, relation between minimum distance and error detecting and correcting capability Linear block codes: encoding and syndrome decoding. Cyclic codes: encoder and decoder for systematic cyclic codes. Convolution codes, code tree and Trellis diagram, Viterbi and sequential decoding, Burst error correction, Turbo codes.

**Text Book:**


1. B.P. Lathi, ―Modern Digital and Analog communication Systems‖, 4th Edition, Oxford University Press,2010.
2. RishabhAnand, Communication Systems, Khanna Publishing House, Delhi.


**Reference Books:**


1. H. Taub, D L Schilling, GautamSaha, ―Principles of Communication‖, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
2. John G. Proakis, ―Digital Communications‖, 4th Edition, McGraw-Hill International.
3. Simon Haykin, ―Communication Systems‖, 4th Edition, Wiley India.
4. H P HSU & D Mitra, ―Analog and Digital Communications‖, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-VI*
### UINDUEC604
### INDUSTRIAL ELECTRONICS

**(L-T-P-3-1-0)**

**Unit-I:** Power Semiconductor Devices: Power semiconductor devices their symbols and static characteristics and specifications of switches, types of power electronic circuits Operation, steady state & switch characteristics & switching limits of Power Transistor Operation and steady state characteristics of Power MOSFET and IGBT Thyristor – Operation V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC.

**Unit-II:** Phase Controlled Rectifiers: Phase Angle Control, Single-phase Half-wave Controlled Rectifier (One quadrant), Single-phase Full-wave Controlled Rectifier (Two quadrant Converters),Performance Factors of Line-commutated Converters, The Performance Measures of Two-pulse Converters, Three phase Controlled Converters Inverters: Introduction Thyristor Inverter Classification, Series Inverters, Parallel Inverter, Three-phase Bridge Inverters, Three-phase Bridge Inverter with Input- circuit Commutation.

**Unit-III:** Choppers: Introduction, Principle of Chopper Operation, Control Strategies, stepup/Down Chopper, Jones Chopper. Introduction to basic Cycloconverters. Control of D.C. Drives: Introduction, Basic Machine Equations, Breaking Modes, Schemes for D.C. Motor Speed Control, Single-phase Separately Excited Drives, Braking Operation of Rectifier Controlled Separately excited Motor, Single-phase Separately Excited Drives, Power Factor Improvement, Three-phase Separately Excited Drives, D.C. Chopper Drives

**Unit-IV:** Rotor Design, Speed Control of Induction Motors, stator Voltage Control, Variable Frequency control, Rotor Resistance Control, Slip Power Recovery Scheme, Synchronous Motor Drives

**Unit-V:** Protection of device and circuits: Introduction, Cooling and heat sinks, Thermal Modeling of Power Switching devices, Snubber Circuits, Reverse Recovery Transients, Supply- and Load- side Transients, Voltage Protection, Current Protections, Electromagnetic Interference.

**Text Books:**


1. M. H. Rashid, ―Power Electronics‖, 3rd Edition, Pearson Education.
2. M. D. Singh & K. Khanchandani, ―Power Electronics‖, Tata McGraw Hill.


**Reference Books:**


1. V.R. Moorthy, ―Power Electronics: Devices, Circuits and Industrial Applications‖, Oxford University

   Press,2007.

2. M.S. JamilAsghar, ―Power Electronics‖,PHI.
3. Chakrabarti&Rai, ―Fundamentals of Power Electronics &Drives‖DhanpatRai& Sons.
4. Ned Mohan, T.M.Undeland and W.P.Robbins, ―Power Electronics:Converters, Applications and Design‖,
   Wiley India.

5. S.N.Singh, ―A Text Book of Power Electronics‖,DhanpatRai& Sons.

# Department of Electronics & Communication Engineering

## *(Faculty of Engineering & Technology)*

## *P.K. University, Shivpuri (MP)*

## *III Year Semester-VI*

### UCONTEC605

### CONTROL SYSTEM-I

**(L-T-P-3-0-0)**

**Unit-I:** Basic Components of a control system, Feedback and its effect, types of feedback control systems. Block diagrams Reduction and signal flow graphs, Modeling of Physical systems: electrical networks, mechanical systems elements, equations of mechanical systems, sensors and encoders in control systems, DC motors in control systems, Analogous Systems.

**Unit-II:** State-Variable Analysis: Vector matrix representation of state equation, state transition matrix, state-transition equation, relationship between state equations and high-order differential equations, relationship between state equations and transfer functions. Similarity Transformation, Decomposition of transfer functions, Controllability and observability, Eigen Value and Eigen Vector, Diagonalization.

**Unit-III:** Time domain Analysis of Control Systems: Time response of continuous data systems, typical test signals for the time response of control systems, the unit step response and time-domain specifications, Steady-State error, time response of a first order system, transient response of a prototype second order system.

**Unit-IV:** Stability of Linear Control Systems: Bounded-input bounded-output stability continuous data systems, zero-input and asymptotic stability of continuous data systems, Routh Hurwitz criterion. Root-Locus Technique: Introduction, Properties of the Root Loci, Design aspects of the Root Loci

**Unit-V:** Frequency Domain Analysis: Mr (resonant peak) and ωr (resonant frequency) and bandwidth of the prototype Second order system, effects of adding a zero to the forward path, effects of adding a pole to the forward path, Polar Plot, Nyquist stability criterion, relative stability: gain margin and phase margin, stability analysis with the Bode plot.

**Text Book:**

1. B.C. Kuo&FaridGolnaraghi, ―Automatic Control Systems‖, 8th Edition, John Wiley India, 2008.

**Reference Books:**

1. I. J. Nagrath& M. Gopal, ―Control System Engineering‖, New Age International Publishers
2. A. Ambikapathy, Control Systems, Khanna Publishing House, Delhi.
2. Joseph J. Distefano III, Allen R. Stubberud, Ivan J. Williams, ―Control Systems‖ Schaums Outlines

Series, 3rdEdition, Tata McGraw Hill, Special Indian Edition 2010.

3. William A. Wolovich, ―Automatic Control Systems‖, Oxford University Press, 2010.

# Department of Electronics & Communication Engineering

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## *P.K. University, Shivpuri (MP)*

## *III Year Semester-VI*

### UMICREC606

### MICROWAVE ENGINEERING LAB

**(L-T-P-0-0-2)**

**List of Experiments**

1. To study microwave test bench.
2. To study the characteristics of reflex klystron tube and to determine its electronic tuning range.
3. To determine the frequency and wavelength in a rectangular waveguide working on $TE_{01}$ mode.
4. To study measurement of reflection coefficient and standing wave ratio using double minima method.
5. To study V-I characteristic of Gunn diode.
6. To measure an unknown impedance with Smith chart.
7. Study of Circulator/Isolator.
8. Study of Attenuator (Fixed and Variable type).
9. To study simple dipole 2 antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
10. To study folded dipole antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
11. To study 2 phase array end-fire antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
12. To study broadside array antenna and to calculate beam-width, front / back ratio, and gain of the antenna.

# Department of Electronics & Communication Engineering
## *(Faculty of Engineering & Technology)*
## *P.K. University, Shivpuri (MP)*
## *III Year Semester-VI*

### UCOMMEC607
### COMMUNICATION- II LAB

**(L-T-P-0-0-2)**

**List of Experiments**

1. To construct a Square wave with the help of Fundamental Frequency and its Harmonic component
2. Study of pulse data coding & decoding techniques for NRZ and RZ formats.
3. Study of Manchester coding and Decoding.
4. Study of Amplitude shift keying modulator and demodulator.
5. Study of Frequency shift keying modulator and demodulator.
6. Study of Phase shift keying modulator and demodulator.
7. Study of single bit error detection and correction using Hamming code.
8. Study of Quadrature Phase shift keying modulator and demodulator.
9. To simulate Differential Phase shift keying technique using MATLAB software.
10. To simulate M-ary Phase shift keying technique using MATLAB software (example8PSK, 16PSK) and perform BER calculations.
11. To simulate convolutional coding using MATLAB software.
12. Design a front end BPSK modulator and demodulator.

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### *III Year Semester-VI*

**UCONTEC608**

## CONTROL SYSTEM-I LAB

**(L-T-P-0-0-2)**

**List of Experiments:**

1. Different Toolboxes in MATLAB, Introduction to Control Systems Toolboxor its equivalent open source freeware software like Scilabusing Spoken Tutorial MOOCs.
2. Determine transpose, inverse values of given matrix.
3. Plot the pole-zero configuration in s-plane for the given transfer function.
4. Determine the transfer function for given closed loop system in block diagram representation.
5. Plot unit step response of given transfer function and find delay time, rise time, peak time and peak overshoot.
6. Determine the time response of the given system subjected to any arbitrary input.
7. Plot root locus of given transfer function, locate closed loop poles for different values of k. Also find out Wd and Wnat for a given root.
8. Create the state space model of a linear continuous system.
9. Determine the State Space representation of the given transfer function.
10. Plot bode plot of given transfer function. Also determine the relative stability by measuring gain and phase margins.
11. Determine the steady state errors of a given transfer function.
12. Plot Nyquist plot for given transfer function and to discuss closed loop stability. Also determine the relative stability by measuring gain and phase margin.

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## *P.K. University, Shivpuri (MP)*

### *III Year Semester-VI*

### UMICREC609

### MICROCONTROLLERS FOR EMBEDDED SYSTEMS LAB

**(L-T-P-0-0-2)**

1. Write a program of Flashing LED connected to port 1 of the 8051 Micro Controller
2. Write a program to generate 10 kHz square wave using 8051.
3. Write a program to show the use of INT0 and INT1 of 8051.
4. Write a program for temperature & to display on intelligent LCD display.
5. Write a program to generate a Ramp waveform using DAC with micro controller.
6. Write a program to Interface GPIO ports in C using MSP430 (blinking LEDs , push buttons)
7. Write a program Interface potentiometer with GPIO.
8. Write a program of PWM based Speed Control of Motor controlled by potentiometer connected to GPIO.
9. Write a program of PWM generation using Timer on MSP430 GPIO.
10. Write a program to Interface an accelerometer.
11. Write a program using USB (Sending data back and forth across a bulk transfer-mode USB connection.)
12. Write a program for Master Slave Communication between 2 MSP430s using SPI
13. Write a program of basic Wi-Fi application – Communication between two MSP430 based sensor nodes.
14. Setting up the CC3100 as a HTTP server.