# *SYLLABUS*

## *FOR*

## *B.TECH. PROGRAMME*

## *IN*

## *ELECTRICAL ENGINEERING*

## *INSTITUTE OF TECHNOLOGY*

***ZAKURA CAMPUS***
***UNIVERSITY OF KASHMIR***
***SRINAGAR J&K, 190006***
***As Per BOS Held In August 2017***

**COURSE STRUCTURE**
**B.Tech 5th Semester ELE**
**University of Kashmir, Zakura Campus**

| Course Code | Course Title | Teaching Periods per week | | | Credits |
|---|---|---|---|---|---|
| | | L | T | P | |
| ELE5117B | Control Systems -II | 3 | 1 | 0 | 4 |
| ELE5217B | Power System –I | 3 | 1 | 0 | 4 |
| ELE5317B | Electromagnetic Field Theory | 3 | 1 | 0 | 4 |
| ELE5417B | Microprocessors | 3 | 1 | 0 | 4 |
| ELE5517B | Digital Signal Processing | 3 | 1 | 0 | 4 |
| ELE5117BL | Control Systems Lab | 0 | 0 | 4 | 2 |
| ELE5417BL | Microprocessors Lab | 0 | 0 | 4 | 2 |
| ELE5517BL | Digital Signal Processing Lab | 0 | 0 | 2 | 1 |
| Total | | 15 | 5 | 10 | 25 |

## Applicable To Batch 2016 & Onwards

# *FIFTH SEMESTER*

**COURSE CODE: ELE-5117B**

**CONTROL SYSTEMS -II**

**Credits: 04**

| S. No | Topics | Number of Hours |
|---|---|---|
| 1. | **State variable modeling:** Block diagram, transfer function and signal flow graphs in state space | 7 |
| 2. | State variable Analysis and design solution of state vector equations, design using state – variable feedback. | 10 |
| 3. | **Concepts of Controllability and Observability:**state estimation, pole allocation, stability and reproducibility, Design of full State Observers, Design by separation principle. | 9 |
| 4. | **Digital control system:** Hardware elements of a digital control system, Advantages of Digital control systems Practical aspects of the choice of sampling rate and multirate sampling, Basic discrete time signals, Quantization & Sampling | 7 |
| 5. | Mathematical modeling, Data reconstruction and filtering of sampled signals, zero order hold. Pulse transfer function. Difference equations, Design of Discrete Data System, Digital P, PI, PID controller | 11 |
| 6. | **Introduction to Advanced Controllers:** Fuzzy logic control, Neural Network, Predictive Controller | 6 |
| Total number of Hours | | 50 |

**TextBooks:**

| S.No | Name of Book | Author | Publisher |
|---|---|---|---|
| 1. | State variable methods and digital control | M. Gopal | Tata Mcgraw Hill |
| 2. | Control system engineering | Norman .S. Nise | John Wiley |
| 3. | Discrete Time Control Systems | K Ogata | Wesley longman |
| 4. | Control systems | A. Anand Kumar | PHI Learning Pvt. Ltd |
| 5. | Feedback control of dynamic systems | Franklin and powel | Prentice hall |

**COURSE CODE: ELE-5217B**

**POWER SYSTEM - I**

**Credits: 04**

| S. No | Topics | Number of Hours |
|---|---|---|
| 1. | Introduction to Power Systems generation, transmission & distribution. Per unit representation of power system variables, Single line diagram, impedance and reactance diagram of a system, per unit calculations | 04 |
| 2. | Overhead line insulator types; pin, suspension, strain, shackle, guy etc. String efficiency & methods of equalizing potential drop over string of suspension insulators. | 05 |
| 3. | Transmission line parameters and their evaluations, types of overhead conductors with calculations of inductance and capacitance. | 10 |
| 4. | Models of short, medium and long transmission lines.Lossless transmission lines; electrical length of a line and its importance, Equivalent circuits of a transmission line, Applications of ABCD representation of Power System components, Power transfer capability of a transmission line, Skin, proximity and Ferranti effect. | 10 |
| 5. | Mechanical Design of transmission line: Sag, span and tension calculations. Electric Power Transmission Towers. | 05 |
| 6. | Classification of cables, Cable conductors, insulating materials, insulation resistance, electrostatic stress, grading of cables, capacitance calculation of single &mult-core cable, losses and current carrying capacity, cross bonding of cables.. Location of faults, methods of laying of underground cables. | 09 |
| 7. | Corona, Visual & critical voltages, corona loss, effect of corona on line design practical considerations | 04 |
| 8. | Element of AC distribution. Single fed, double fed and ring main distributor. | 03 |
| Total number of Hours | | 50 |

**TextBooks:**

| S.No | Name of Book | Author | Publisher |
|---|---|---|---|
| 1. | Power System Analysis | J.J. Grainger and W.D Stevenson | Mcgraw hill |
| 2. | Electric Power Systems | B.W. Weedy and B.J. Cory | John Wiley and sons |
| 3. | Electric Power Systems | C.L. Wadhwa | New age international |
| 4. | Power System Engineering | Nagrath and Kothari | Tata Mcgraw hill |
| 5. | Power System Analysis | HadiSaadat | McGraw Hill |

**COURSE CODE: ELE-5317B**

**ELECTRO-MAGNETIC FIELD THEORY**

**Credits: 04**

| S. No | Topics | Number of Hours |
|---|---|---|
| 1. | **Electrostatics:** Curvilinear Coordinates, The Dirac-Delta Function, Helmholtz Theorem, Scalar and Vector Potentials, The Electrostatics field, Divergence and Curl of electrostatics fields, Applications of Gauss law, Introduction to potential, Poisson equation and Laplace equation, The potential of a localized charge distribution, Electrostatic boundary conditions, Work and Energy in electrostatics, Basic properties of conductor, The surface charge on a conductor. | 08 |
| 2. | **Special Techniques for Calculating Potentials:** Laplace equation in one, two & three Dimensions, Boundary conditions and uniqueness theorem, Conductors and the 2nd uniqueness theorem, The classic image problem, The induced surface charge, Force and energy other image problems, Separation of variables, Approximate Potentials at large distance, the monopole and dipole terms, The Electric field of a dipole. | 10 |
| 3. | **Magnetostatic Fields:**The Lorentz force law, The Biot-Savarts law, Divergence and curl of B, Magnetic Vector potential, Magnetostatic Boundary conditions, Multipole expansion of the Vector Potential, Magnetization, Torque and force on magnetic dipoles, Effect of magnetic field on atomic orbits, Amperes law in magnetized material, Magnetic Susceptibility and permeability. | 08 |
| 4. | **Electromagnetic Waves:** Electromagnetic wave in one Dimension, Sinusoidal waves, Polarization, Boundary condition, Reflection and transmission, Energy and momentum of electromagnetic waves, Propagation through linear media, Reflection and refraction at oblique incidence, electromagnetic waves in conductors, Rectangular Wave guides, TE and TM modes. | 12 |
| 5. | **Electrodynamics:**Electrodynamics before Maxwell, Maxwell's equations and magnetic charge, Maxwell's equation inside matter, Boundary conditions, Scalar and vector potentials, Gauge Transformations, Coulomb Gauge and Lorentz Gauge, Lorentz Gauge, Lorentz force law in potential form, Newton's third law in electrodynamics, Poynting theorem, Maxwell's Stress tensor, Conservation of momentum, Electromagnetic waves in non-conducting media, Monochromatic plane waves in conducting media. | 12 |
| Total number of Hours | | 50 |

**TextBooks:**

| S.No | Name of Book | Author | Publisher |
|---|---|---|---|
| 1. | Introduction to electro-dynamics | David J. Griffiths | Prentice hall india |
| 2. | Electrodynamics | J.D. Jacson | Pearson |
| 3. | Mathematical method for Physicists | Arfken Weber | Harcourt (INDIA) |
| 4. | Classical Theory & Fields | L.D. Landau, E.M. Lypshitz | Pergman |

**COURSE CODE: ELE-5417B**

**MICROPROCESSORS**

**Credits: 04**

| S. No | Topics | Number of Hours |
|---|---|---|
| 1. | **Microcomputer Structure and Operations:** Basic Microcomputer Elements, Typical Microcomputer Structure, CPU, Memory System, | 2 |
| 2. | **Overview of Microprocessor:** Basic Terminology,evolution of Microprocessors, Typical 8, 16 and 32 bit Microprocessors, State of Art of μ P, why we study 8085 μ P. | 4 |
| 3. | **8085 μp Architecture:** Pin diagram, detailed internal architecture, state transition Diagrams, T-states (clock cycles), machine cycles, instruction cycles, instruction formats. | 6 |
| 4. | **Instruction Set and Programming Techniques:** Different addressing modes, complete description of all instructions with macro and micro RTL (Register Transfer language), programming examples, simulation of time delays. | 12 |
| 5. | **Interrupts:** Concept of interrupts, priority of interrupts signals, software generated interrupts and hardware generated interrupts. | 6 |
| 6. | **Serial I/O:** Introduction with reference to 8085, general concepts. | 6 |
| 7. | **Interfacing:** Concept of fold back addresses, memory maps, memory mapped I/O isolated I/o, interfacing of seven segment LED display, toggle switches, keyboard interfacing, memory interfacing, simplification of interfacing circuitry with the help of decoders, general purpose programmable peripheral devices, interfacing of A/D and D/A conversion devices. | 8 |
| 8. | Introduction to 8086 μp | 6 |
| Total number of Hours | | 50 |

**TextBooks:**

| S.No | Name of Book | Author | Publisher |
|---|---|---|---|
| 1. | Microprocessor Architecture Programming and Applications with the 8085 | Ramesh S. Gaonkar. | Prentice hall |
| 2. | Microprocessors and Programmed Logic | K.L. Short | Prentice hall |
| 3. | Microprocessors: Theory and Applications (Intel and Motorola) | M. Rafiquzzaman | Prentice hall |

**COURSE CODE: ELE-5517B**

**DIGITAL SIGNAL PROCESSING**

**Credits: 04**

| S. No | Topics | Number of Hours |
|---|---|---|
| 1. | **Discrete Time Signals & Systems:** Sequences, & sequence operations, Discrete-time systems. Linear Time – Invariant systems, impulse response, causality, stability. Frequency-Domain Representation of Discrete-Time signals and systems, Fourier Transforms, properties, theorems. | 8 |
| 2. | **Sampling of Continuous – Time Signals:** Periodic sampling, frequency-domain representation of sampling, reconstruction of signals, discrete-time processing of continuous –time signals, continuous –time processing of Discrete-time signals, changing the sampling rate. | 10 |
| 3. | **Transform Analysis of Linear time Invariant Systems:** Z- Transform, Region of Convergence, properties, Inverse Z-Transform, Frequency Response of LTI systems, system functions, linear constant coefficient, difference equations FIR and IIR systems, Frequency Response. | 12 |
| 4. | **Structure of Discrete-Time Systems:** Block Diagram Representation of linear constant-coefficient Difference equations, signal flow graph representation. Basic structures for IIR systems, Transposed forms, Basic network structures for FIR systems. | 10 |
| 5. | **Filter Design Techniques:** Design of Discrete-Time IIR filters from continuous – Time filters. Impulse invariance, bilinear transformation. Butterworth Chebyshev, Eliptic Approximation, low pass, high pass, band-pass and Band-stop filters, design of FIR filters by windowing. Kaiser, Hamming, Hamming windows. | 10 |
| Total number of Hours | | 50 |

**TextBooks:**

| S.No | Name of Book | Author | Publisher |
|---|---|---|---|
| 1. | Discrete Time Signal Processing. | A.V Oppenheim and R. W Schafer | Prentice hall international |
| 2. | Digital Signal Processing Principles, Algorthims and Applications. | John G. Proakis and D.G Manolavis: | Prentice hall |
| 3. | Introduction To Digital Signal Processing. | J.R Johnson | Prentice hall |
| 4. | Theory and Application of Digital Signal Processing. | L.R Rabinder and B. Gold | Prentice hall |

**COURSE CODE: ELE-5117BL**

**CONTROL SYSTEMS LAB**

**Credits: 02**

| S. No. | Experiment |
|---|---|
| 1. | Use of MATLAB / SIMULINK /Control System tool boxes, neural & fuzzy toolboxes. |
| 2. | Analysis of Control System in MATLAB. |
| 3. | To study the computer simulation of a number of systems |
| 4. | To study the torque-speed characteristics of an AC servomotor. |
| 5. | To study the time response of a variety of simulated linear systems. |
| 6. | To study the role of feedback in a DC speed control system. |
| 7. | To study the role of feedback in a DC position control system. |
| 8. | To study the role of a combination of P,I and D control actions in a variety of simulated linear systems |
| 9. | System identification using frequency domain techniques |
| 10. | Lead/ lag compensator design |
| 11. | Computer control of systems |
| 12. | Control of stepper motor |
| 13. | Control system (State Space) study |

**COURSE CODE: ELE-5417BL**

**MICROPROCESSORS LAB**

**Credits: 02**

| S. No. | Experiment |
|---|---|
| 1. | Microprocessors (8085) training kit and its working. |
| 2. | Programs related to data transfer between registers, between registers and memory. |
| 3. | Programs related to logic instructions. |
| 4. | Programming techniques with additional instructions, looping, counting and indexing. |
| 5. | i) To develop a program to add two double byte numbers.<br>ii) To develop a subroutine to add two floating point quantities. |
| 6. | i) To develop program to multiply two single byte unsigned numbers, giving a 16 bit product<br>ii) To develop subroutine which will multiply two positive floating point numbers |
| 7. | To write program to evaluate P* Q*+R* & S are 8 bit binary numbers. |
| 8. | To write a program to divide a 4 byte number by another 4 byte number. |
| 9. | To write a program to divide an 8 bit number by another 8 bit number upto a fractional quotient of 16 bit. |
| 10. | Write a program for adding first N natural numbers and store the results in memory location X. |
| 11. | Write a program which decrements a hex number stored in register C. The Program should half when the program register reads zero. |
| 12. | Write a program to introduce a time delay of 100 ms using this program as a subroutine display numbers from 01H to OAH with the above calculated time delay between every two numbers. |
| 13. | N hex numbers are stored at consecutive memory locations starting from X. Find the largest number and store it at location Y. |
| 14. | Interfacing concepts. Switch and LED interfacing. Square wave generation. |
| 15. | ADC interfacing. |
| 16. | Interface a display circuit with the microprocessor either directly with the bus or by using I/O ports. Write a programme by which the data stored in a RAM table is displayed. |

**COURSE CODE: ELE-5517BL**

**DIGITAL SIGNAL PROCESSING LAB**

**Credits: 01**

| S. No. | Experiment |
|---|---|
| 1. | Write a program to generate sine/triangular/square wave. |
| 2. | Write a program to generate sine/triangular/square wave of variable. Amplitude and frequency. |
| 3. | Write a program to generate AM signal |
| 4. | Write a program to generate an echo of an audio signal. |
| 5. | Write a program to perform convolution of two signals |
| 6. | Write a program to perform DFT&IDFT of a signal |
| 7. | Write a program to design alow pass audio digital filter |