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Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment; MSE - Mid Semester Examination; ESE - End Semester Examination;

Student Contact Hours/Week : 25
Total Credits(C) : 21
KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme

**U18MH301 ENGINEERING MATHEMATICS-III**

**Class:** B.Tech.III-Semester  
**Teaching Scheme:**  
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**Branch:** Common to all branches  
**Examination Scheme:**  
| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

**Course Learning Objectives (LOs):**

This course will develop students’ knowledge in/on …

- **LO1:** Laplace transforms to solve certain differential equations
- **LO2:** representing a function as a Fourier series in the given interval
- **LO3:** complex analytic functions and their applications
- **LO4:** complex integral theorems to evaluate certain real integrals

**UNIT – I (9 + 3)**

**Laplace Transforms:** Integral transforms, Kernel of a transform, Laplace transform of a function, Inverse Transform-Existence and uniqueness of Laplace Transforms, S-plane and region of convergence (ROC), Laplace Transform of some commonly used signals - Dirac-delta (impulse) function \( \delta(t) \), step function \( u(t) \), ramp \( tu(t) \), parabolic \( t^2u(t) \), real exponential \( e^{at}u(t) \), complex exponential \( e^{j\omega t}u(t) \), sine and cosine functions, damped sine and cosine functions, hyperbolic sine and cosine functions, damped hyperbolic sine and cosine functions, rectangular pulse and triangle. Properties of Laplace Transforms - linearity, first shifting theorem (frequency shift property), Laplace transforms of derivatives and integrals, time scaling property, time reversal property, Laplace transform of Heaviside unit step function, second shifting theorem (time shift property), initial value and final value theorems, Laplace transform of periodic functions - convolution theorem.

**Operational Calculus:** Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace transforms. Application of Laplace transforms to the first order and second order system subjected to impulse, step, periodic, rectangular, square, ramp, triangular and sinusoidal functions.

**UNIT-II (9+3)**

**Fourier Series:** Periodic functions, orthogonal and orthonormal functions, Euler formulae, representation of a function as Trigonometric Fourier series (FS) in a range of length \( 2\pi \), conditions for the existence of Fourier series (Dirichlet’s conditions), FS for typical wave forms - square wave, pulse train, impulse train (comb function), periodic rectangular wave, triangle, saw tooth, half wave rectified signal, full wave rectified signal, plotting FS coefficients - line spectrum (magnitude and Phase spectra), Fourier series on an arbitrary period, effects of symmetry of function on FS coefficients, half range series – half range cosine and sine series expansions, exponential FS

**UNIT-III (9+3)**

**Complex Variables:** Functions of complex variables, limit, continuity, differentiability, analytic functions, Cauchy-Riemann Equations in cartesian and polar coordinates. elementary functions,

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
harmonic functions, construction of analytic functions, applications to find velocity potential and stream function of a flow, conformal mapping and bilinear transformation

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, integral of a non-analytic function, dependence on path of integration, ML-inequality, Cauchy’s integral theorem, Cauchy’s integral formula, series expansion of complex functions: Taylor’s series and Laurent’s series, zeros and singularities, residues, Residue theorem- applications of residue theorem to the properly chosen integrals around a unit circle and semi-circle.

******

Text Book:
   (Chapters 21,10,20)

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: apply Laplace transform to solve certain differential equations whose solutions cannot be computed using classical methods

CO2: describe a given function as Fourier series in an interval

CO3: construct analytic function, find velocity potential and stream function of a fluid flow using complex analytical methods

CO4: represent a given function in Taylor’s & Laurent’s series and evaluate certain real integrals using integral theorems

Course Articulation Matrix: U18MH301 ENGINEERING MATHEMATICS-III

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U18TP302   SOFT AND INTERPERSONAL SKILLS

Class: B. Tech. III-Semester
       B. Tech. IV-Semester
Branch: ME, CSE, IT
        CSE, EIE, EEE, ECE

Teaching Scheme:

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Examination Scheme:

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Course Learning Objectives (LOs):

This course will develop students’ knowledge in/on....

LO1 : analyzing self and learning to overcome possible threats
LO2 : group dynamics to demonstrate respect for the opinions and beliefs of group
LO3 : effective presentations using visual aids and analyzing the videos
LO4 : communicating professionally, making resume in line with industry expectations

LIST OF ACTIVITIES

Introduction

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<th>Description</th>
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<td>Activity 2</td>
<td>SWOT analysis</td>
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<td>Activity 3</td>
<td>Debate</td>
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<tr>
<td>Activity 4</td>
<td>Group Discussion</td>
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| Activity 5 | Presentations through PPTs |
| Activity 6 | Video Synthesis          |
| Activity 7 | Resume Writing           |
| Activity 8 | Email Etiquette          |

Activity 9 : My interview Plan: Self Introduction & FAQs
Activity 10 : My Career Plan Oral presentation

Comprehensive Presentation

Text Books:


References:

1. https://onlinecourses.nptel.ac.in/noc19_hs20/preview
2. https://onlinecourses.nptel.ac.in/noc18_hs30/preview

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: introspect to convert strengths into opportunities, identify weaknesses, bypass threats

CO2: present views on various issues confidently in a group

CO3: make effective PPT presentations, synthesize videos

CO4: prepare a professional resume, communicate effectively to attain better opportunities

| Course Articulation Matrix: U18TP302 SOFT AND INTERPERSONAL SKILLS |
|-----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
| CO1 | U18TP302.1 | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| CO2 | U18TP302.2 | - | - | - | - | - | - | - | 2 | 3 | 3 | - | - | - | - |
| CO3 | U18TP302.3 | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - | - |
| CO4 | U18TP302.4 | - | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |

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U18EE303 NETWORK THEORY

Class: B. Tech.III-Semester

Teaching Scheme:

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Branch: Electrical and Electronics Engineering

Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):

This course will develop students’ knowledge in/on:

LO1: steady state analysis of electrical networks, resonance and network topology
LO2: network theorems and their application for network analysis
LO3: time response analysis of networks
LO4: two port networks and their equivalent circuit representation

UNIT – I (9+3)

Circuit Elements and Relations: Introduction, Kirchhoff’s laws, types of sources and source transformations, network reduction by star-delta transformation

Steady State Analysis of Circuits for Sinusoidal Excitations: Analysis of single-phase series, parallel and series-parallel circuits, resonance - series and parallel resonance, bandwidth, q-factor, mesh and nodal analysis; 3-phase network analysis - balanced and unbalanced networks

Network Topology: Topological description of networks - lumped Vs distributed circuits, network graph theory - tree, co-tree and loops, incidence matrix, fundamental tie-set and cut-set matrices

UNIT – II (9+3)

Network theorems and applications: Introduction, superposition theorem, Thevenin’s theorem, Norton's theorem, maximum power transfer theorem, reciprocity theorem, Millman's theorem, Tellegen's theorem, compensation theorem and substitution theorem

UNIT – III (9+3)

Time response analysis of networks: Transient analysis of RL, RC, RLC series and parallel networks with step, impulse, sinusoidal and pulse excitation, initial conditions, analysis with special signal waveforms - ramp, triangular, train of pulses, delayed input

UNIT – IV (9+3)


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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Books:

Reference Books:

**Course Learning Outcomes (COs):**
On completion of this course, the students will be able to…

**CO1:** determine voltage, current, power by performing steady state analysis, calculate bandwidth, Q-factor of resonant circuits and construct incidence, tie-set, cut-set matrices using network topology

**CO2:** apply suitable network theorems to applications in electrical engineering

**CO3:** evaluate transient & steady state response of RLC circuits with step, sinusoidal & other special signals

**CO4:** find two port network parameters and draw equivalent circuit of given two-port network

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**Course Articulation Matrix: U18EE303 NETWORKTHEORY**

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"KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme"
U18EE304  ELECTRICAL MEASUREMENTS & INSTRUMENTATION

Class:  B. Tech.III-Semester  Branch: Electrical and Electronics Engineering
Teaching Scheme:  Examination Scheme:

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Course Learning Objectives (LOs):
This course will develop students’ knowledge in/on:

LO1: significance and errors of measuring instruments, performance of various instruments to measure voltage and current

LO2: performance of various instruments for measuring power, energy, power factor and unknown resistance, inductance & capacitance measurement using bridges

LO3: construction, performance and errors in CTs, PTs and their use for measuring high range current and voltage; applications of DC and AC Potentiometers for measurement and calibration of electrical quantities

LO4: construction, operation and applications of electronic instruments (CRO, DVM and DSO) and transducers (Strain gauge, LVDT, Thermocouple)

UNIT – I (9)

Introduction and Error Analysis: Significance of measurement, static characteristics of measuring system- linearity, sensitivity, precision, accuracy, errors in measuring instruments

Voltage and Current Measuring Instruments: Construction, operation, torque equation, sensitivity, errors, advantages and disadvantages of Permanent Magnet Moving Coil (PMMC) instrument, Moving Iron (MI) instruments and electrodynamometer type instruments, extension of ranges of voltmeters and ammeter, loading effect on measuring instruments

UNIT – II (9)

Measurement of Power, Energy and Power factor: Construction, operation, torque equation, errors, advantages and disadvantages of dynamo meter type wattmeter, induction type energy meter, measurement of three phase active and reactive power, phantom loading, introduction to static energy meter and smart energy meter

DC Bridges: Measurement of unknown resistance using Wheatstone bridge, Kelvin’s double bridge, Megohm bridge and megger

AC Bridges: Measurement of unknown inductance using Maxwell’s bridge, Anderson’s bridge, Hay’s bridge, Owen’s bridge, measurement of unknown capacitance using De Sauty’s bridge, Schering bridge and Wien’s bridge

UNIT – III (9)

Instrument Transformers: Introduction, uses, ratios and burden, current transformers-construction and errors, effect of secondary open circuit, potential transformers- construction and errors, testing of current transformers with Silsbee’s method, Introduction to Hall effect current sensor

Potentiometers: Construction, standardization and applications of DC potentiometers, construction and operation of phase shifting transformer and phase shifting circuit, construction, standardization and operation of polar and co-ordinate type AC potentiometers, applications of AC potentiometers

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
UNIT-IV (9)

**Electronic Instruments**: Construction and operation of Cathode Ray Oscilloscope (CRO), electrostatic deflection system, horizontal and vertical amplifiers, screens and probes used in CRO, deflection sensitivity and deflection factor, measurement of unknown frequency and phase using Lissajous patterns, construction and operation of Digital Voltmeters (DVM), block diagram representation of Digital Storage Oscilloscope (DSO)

**Transducers**: Introduction and classification of transducers, theory of Strain gauges, thermocouples, Linear Variable Differential Transformer (LVDT)

*****

**Text Book:**

**Reference Books:**

**Course Learning Outcomes (COs):**
On completion of this course, the students will be able to…

**CO1**: compare the performance of conventional and modern instruments and select suitable instrument based on their application to measure voltage, current, power, power factor & energy

**CO2**: determine the unknown circuit parameters (R,L,C) using DC & AC bridges

**CO3**: describe the operation of CTs, PTs, compute the errors & their applications for measuring high range current and voltage and apply the DC &AC potentiometers for measurement of electrical quantities & calibration of electrical equipment

**CO4**: measure electrical & non-electrical quantities using CRO, DVM, DSO and describe the transducers employed for measurement of strain, temperature & displacement

**Course Articulation Matrix: U18EE304 ELECTRICAL MEASUREMENTS & INSTRUMENTATION**

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EE305 ELECTROMAGNETICFIELDS

Class: B. Tech.III-Semester Branch: Electrical and Electronics Engineering
Teaching Scheme: Examination Scheme:

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Course Learning Objectives (LOs):
This course will develop students’ knowledge in/on….

LO1: concepts of electric forces and fields for different configurations
LO2: fields in different materials and capacitance calculations
LO3: effect of magnetic field in electrical systems, magnetic potentials and inductance
LO4: Maxwell’s equations, wave equation

UNIT –I (9)

Introduction: Cartesian, Cylindrical and Spherical Co-ordinate Systems, Field theory Vs Circuit theory

Static Electric Fields: Coulomb's law, electric field intensity, field due to different charge configurations, electric flux, electric flux density, Gauss’ law and its applications, Divergence theorem, relation between D and E, work done in moving a unit positive charge, electric potential, absolute potential, potential difference between two points and its independence in path of integration, potentials caused by different types of charge configurations, relation between E and V, electro static energy, energy density

UNIT –II (9)

Dipoles: Potential and electric field at a point due to electric dipole, torque on electric dipole when placed in electric field

Electric field in materials: Conductors in electrostatic fields, polarization in dielectrics, dielectric strength & constant, boundary conditions between dielectrics, Laplace’s and Poisson's equations

Capacitance: Capacitance of Parallel plate, cylindrical and spherical capacitors, conduction and convection currents, current density

UNIT –III (9)

Static Magnetic fields: Concept of magnetic field, Biot- Savart's law, Ampere's law and its applications, magnetic flux and flux density, magnetic field caused by different types of current configurations, scalar and vector magnetic potentials, calculation of vector magnetic potentials for simple cases, vector Poisson's equation

Magnetic Forces: Force on a moving charge, force on a differential current element, force between differential current elements, magnetic boundary conditions, magnetic dipole, magnetization in material

UNIT –IV (9)

Inductance: Self-inductance, mutual-inductance, calculation of inductance of solenoid

Maxwell's equations: Maxwell's equations for static fields, Faraday’s law, displacement current, Maxwell's equations for time varying fields, wave equation

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Book:


References Books:


Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: compute the electrostatic fields for different configurations by using suitable coordinate systems

CO2: analyse the polarization in dielectric materials and determine the capacitance for different charge configurations

CO3: compute the static magnetic fields for different current configurations and analyze the magnetization in various types of magnetic materials

CO4: determine the inductance for different current configurations and explain Maxwell’s equations related to time-varying fields

Course Articulation Matrix: U18EE305 ELECTROMAGNETICFIELDS

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EC310  ELECTRONIC DEVICES AND CIRCUITS

Class: B. Tech.III-Semester  Branch: Electrical and Electronics Engineering
Teaching Scheme:

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Examination Scheme:
Continuous Internal Evaluation  40 marks
End Semester Examination  60 marks

Course Learning Objectives (LOs):
This course will develop students’ knowledge in/on….

LO1 : conduction in semiconductors and semiconductor diode characteristics
LO2 : half wave - full wave rectifiers with and without filters
LO3 : transistors characteristics, biasing and thermal stabilization
LO4 : FET characteristics, FET biasing and characteristics of special devices SCR, UJT, DIAC, TRIAC & LED

UNIT-I (9)
Conduction in Semiconductors: Conductivity of a semiconductor, carrier concentrations in an intrinsic semiconductor, donor and acceptor impurities, charge densities in a semiconductor, fermi level in a semiconductor having impurities, diffusion, carrier life time, continuity equation, the Hall effect

Semiconductor Diode Characteristics: Qualitative theory of P-N junction, P-N Junction as a diode, band structure of an open circuited p-n junction, quantitative theory of P-N diode currents, the volt-ampere characteristics, the temperature dependence of P-N Characteristics, diode resistance, space charge or transition capacitance, diffusion capacitance, breakdown diodes, the tunnel diode, characteristics of a tunnel diode

UNIT-II (9)
Rectifiers: A half wave rectifier, ripple factor, a full wave rectifier, harmonic components in rectifier circuits, inductor filters, capacitor filters, approximate analysis of capacitor filters, L-section filter, multiple L-section filter, π-section filter

UNIT-III (9)
Transistor Characteristics: The junction transistor, transistor current components, the transistor as an amplifier, the common base configuration, the common emitter configuration, the common collector configuration

Transistor Biasing & Thermal Stabilization: The operating point, transistor as a switch, bias stability, collector to base bias, self-bias, stabilisation against variations in VBE and β for the self bias circuit, bias compensation, thermistor & sensistor compensation, thermal runaway and thermal stability, photo transistor

UNIT-IV (9)
Field Effect Transistors: Construction and characteristics of JFETs, transfer characteristics, depletion-type MOSFET and enhancement-type MOSFET

FET Biasing: Fixed bias configuration, self-bias configuration, voltage divider biasing, common gate configuration, common drain configuration, depletion-type MOSFETs, enhancement-type MOSFETs

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
**Special Devices**: Silicon Controlled Rectifier, Basic Silicon Controlled Rectifier operation, SCR characteristics & ratings, Silicon Controlled Switch, DIAC, TRIAC, Uni-Junction Transistor, LED, photo Diode, Photo Transistor, LASER and LCD

******

**Text books:**

**Reference Books:**

**Course Learning Outcomes (COs):**
On completion of this course, the students will be able to…

- **CO1**: analyze conduction in semiconductors and estimate the diode parameters from its characteristics
- **CO2**: examine the performance characteristics of rectifiers with and without filters
- **CO3**: design the biasing circuits, compare the various configurations of BJT
- **CO4**: design of FET biasing circuits, study the characteristics of special devices

**Course Articulation Matrix: U18EC310 ELECTRONIC DEVICES AND CIRCUITS**

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EE307  ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY

Class:    B. Tech.III-Semester  Branch: Electrical and Electronics Engineering
Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):

This laboratory course will develop students’ knowledge in/on….

LO1 : calibration of single-phase energy meter, LPF wattmeter & voltmeter

LO2 : measurement of resistance, inductance & capacitance using AC and DC bridges and measurement of three phase active power and reactive power

LO3 : measurement of ratio error for CTs and PTs

LO4 : measurement of frequency and phase angle using CRO; displacement, strain and temperature measurement using LVDT, strain gauge and thermocouple

LIST OF EXPERIMENTS

1. Measurement of energy using conventional energy meter and static energymeter
2. Calibration of LPF wattmeter by phantomloading
3. Measurement of three phase active power by using two wattmetermethod
4. Measurements of three phase reactive power using single wattmetermethod
5. Measurement of unknown resistance using Wheatstonebridge
6. Measurement of inductance using Maxwell’s inductance-capacitancebridge
7. Calibration of PMMC voltmeter using DCPotentiometer
8. Determination of ratio error of current transformer and potentialtransformer
9. Measurement of phase angle and frequency using Lissajous patterns ofCRO
10. Displacement measurement using Linear Variable Differential Transformer(LVDT)
11. Measurement of strain using straingauge
12. Study of characteristics of J-typethermocouple
13. Calibration of conventional single-phase energy meter with phantomloading

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Laboratory Manual:

1. Electrical Measurements & Instrumentation Laboratory Manual, Department of EEE, KITSW.

Reference Book:

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: calibrate single phase energy meter, LPF wattmeter using direct & phantom loading and calibration of voltmeter using DC potentiometer

CO2: measure unknown resistance, inductance & capacitance using AC & DC bridges, three phase active power & reactive power using two wattmeter & single wattmeter method

CO3: determine the ratio error in CTs and PTs.

CO4: apply LVDT, strain gauge, thermocouple for the measurement of non-electrical quantities and CRO for the measurement of frequency & phase angle using Lissajous patterns

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Course Learning Objectives (LOs):
This laboratory course will develop students’ knowledge in/on:…
LO1 : network theorems
LO2 : two port network parameters
LO3 : mesh and nodal analysis of electrical networks using MATLAB
LO4 : transient analysis of series circuits using MATLAB

LIST OF EXPERIMENTS
1. Verification of superposition theorem
2. Verification of Thevenin's theorem
3. Verification of maximum power transfer theorem
4. Verification of reciprocity theorem
5. Frequency response of series RLC circuit
6. Determination of Z-parameters of two-port network
7. Determination of Y-parameters of two-port network
8. Determination of ABCD parameters & inverse ABCD parameters of two-port network
9. Determination of hybrid parameters & inverse hybrid parameters of two-port network
10. Use of mesh analysis to find the current flowing through the element using MATLAB software for the given circuit
11. Determination of nodal voltages of the given circuit using MATLAB software
12. Time response analysis of network using MATLAB software

Laboratory Manual:
1. Networks & Simulation Laboratory Manual, Department of EEE, KITSW.

Reference Books:
Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: conduct experiment to validate network theorems
CO2: determine network parameters for a given two port network
CO3: simulate electrical circuit to perform mesh and nodal analysis using MATLAB
CO4: simulate and evaluate the time response of AC series circuits using MATLAB

<p>| Course Articulation Matrix: U18EE308 NETWORKS &amp; SIMULATIONLABORATORY |
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U18EC311  ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Class:  B. Tech.III-Semester  Branch:  Electrical and Electronics Engineering
Teaching Scheme:

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Examination Scheme:

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Course Learning Objectives (LOs):

This laboratory course will develop students’ knowledge in/on....

LO1: characteristics of diodes, rectifiers, BJT & FET
LO2: single stage amplifiers design & analysis
LO3: feedback amplifiers & oscillator circuits analysis
LO4: tuned voltage amplifiers & power amplifiers

LIST OF EXPERIMENTS

1. Characteristics of a semiconductor diode & Zenerdiode
2. Half-wave / full - wave rectifier with and without filters
3. BJT characteristics – CEconfiguration
4. Biasing of transistor using fixed bias,self-bias
5. FET characteristics CS (CommonSource)
6. Design of single stage BJT amplifiers and its frequencyresponse
7. Design of FET CS Amp and its frequencyresponse
8. Design of voltage series feedback amp
9. Design of RC Phase ShiftOscillator
10. Design of LCOscillator
11. Design of class B poweramplifier
12. Design of Single tuned amplifier

******

Laboratory Manual:

1. Electronic Devices and Circuits Laboratory Manual, Department of ECE, KITSW

Reference Book:

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: examine the characteristics of diode, BJT & FET and determine rectifier circuit parameters

CO2: design single stage & multi stage amplifiers and analyze circuits for the given specifications

CO3: evaluate the parameters of feedback amplifiers and design RC & LC oscillators circuits for a specified frequency

CO4: determine the performance parameters of tuned & power amplifiers

Course Articulation Matrix: U18EC311 ELECTRONIC DEVICES & CIRCUITSLABORATORY

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Total: 17/19* 2 8 21

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment; MSE - Mid Semester Examination; ESE - End Semester Examination;

* indicates mandatory non-credit course for Lateral Entry Students only

Student Contact Hours/Week : 27/29*

Total Credits(C) : 21

Open Elective-I
- U18OE403A: Object Oriented Programming (CSE)
- U18OE403B: Fluid Mechanics & Hydraulic Machines (CE)
- U18OE403C: Mechatronics (ME)
- U18OE403D: Web Programming (IT)
- U18OE403F: Strength of Materials (ME)

Open Elective-II
- U18OE401A: Applicable Mathematics (MH)
- U18OE401C: Elements of Mechanical Engineering (ME)
- U18OE401E: Fundamentals of Computer Networks (IT)

Open Elective-I based Laboratory
- U18OE411A: Object Oriented Programming Laboratory (C)
- U18OE411B: Fluid Mechanics & Hydraulic Machines Laboratory (CE)
- U18OE411C: Mechatronics Laboratory (ME)
- U18OE411D: Web Programming Laboratory (IT)
- U18OE411F: Strength of Materials Laboratory (ME)

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Unit – I (6)


Unit – II (6)

Modern Science and Indian Knowledge System: Introduction, Vedas as basis for modern science, architectural developments, medicine and its relevance, mathematical sciences in Vedas, space and military related developments, chemical sciences

Unit – III (6)

Yoga and Holistic Health Care: Healthy mind in healthy body, yoga: definition, types, yoga to keep fit: diet, yoga asanas, fundamentals, breathing techniques in Patanjali yoga tradition, pranayama, chakras, meditation, benefits of yoga – physical health, emotional health, prevention of disease, reducing or alleviating symptoms of problems

Unit – IV (6)

Case studies – Yoga Practice: Yoga as an effective tool for management of human crisis – depression, self-concept & mental health, yoga for stress management, yoga: a way to cure for insomnia

Requisite: Yoga practice sessions are to be conducted for all the students taking this course by the time they complete Unit 1 and Unit 2

*****

Text Books:

1. Sathish Chandra Chaterjee, Dhirendramohan Datta, *An Introduction to Indian Philosophy*, New Delhi: Rupa Publications Pvt. Ltd. (Chapter 2,3)
Ramakrishna Mission Institute of Culture


4. RN Jha, *Science of Consciousness Psychotherapy and Yoga Practices*, New Delhi: Vidyanidhi Prakasham, 2016 (Chapter 4, 5, 6, 7,8)

Reference Book:


**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to…

**CO1:** summarize the basic structure of Vedas, Upavedas, Vedanga, Upanga

**CO2:** explain Vedas as principal source of knowledge for scientific inventions

**CO3:** describe different yogasanas, breathing techniques, chakras, meditation and their benefits

**CO4:** discuss the benefits of yoga as an effective tool for management of human crisis

**Course Articulation Matrix: U18MH415 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**

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U18OE401A APPLICABLEMATHEMATICS

Class: B. Tech.IV-Semester  Branch: Common to all branches
Teaching Scheme:  Examination Scheme:

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Course Learning Objectives (LOs):
This course will develop students’ knowledge in / on …
LO1: application of Fourier series to solve wave equation, heat conduction equation and Laplace equation
LO2: the methods of fitting curves by the method of least squares, statistical methods and probability distributions with applications to engineering disciplines
LO3: finite difference operators, the concept of interpolation and numerical integration
LO4: numerical methods and application to find numerical solutions of differential equations

UNIT-I (9+3)
Applications of Partial Differential Equations: Basic concepts of partial differential equations, classification of second order partial differential equations, solution of a partial differential equation, solution through the method of separation of variables
Vibrating String: Wave equation and its solution by the method of separation of variables, D’Alembert’s solution of wave equation, solutions of various boundary value problems based on vibrating string
One Dimensional Heat Flow: Transient heat flow equation, heat flow through a bar of finite length with homogeneous and non-homogeneous boundary conditions, heat flow through a bar with insulated ends
Two Dimensional Heat Flow: Equation of two dimensional heat flow (Laplace’s equation) under steady state / the electrostatic potential of electrical charges in any region that is free of these charges (problems based on Trigonometric FS only), solution of Laplace’s equation in cartesian and polar form, heat flow through infinite rectangular plates, finite square plate and semicircular and circular plates

UNIT-II (9+3)
Statistics: Statistical data: Review of measures of central tendency and measures of dispersion, correlation coefficient, rank correlation, regression – Linear regression equations
Curve Fitting: Method of least squares – fitting of (i) Straight line (ii) Second degree parabola, Exponential curves, most plausible solution of a system of linear algebraic equations
Probability: Review of the concepts of probability, random variables, Discrete and continuous probability distributions, mean and variance of a distribution, Binomial distribution, Poisson distribution, and Normal distribution, fitting of these probability distributions to the given data

UNIT-III (9+3)
Numerical Analysis: Finite differences and difference operators
Interpolation: Newton’s forward and backward interpolation formulae. Lagrange interpolation
Numerical Differentiation: First and second derivatives using forward and backward interpolation

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
polynomials at the tabulated points

**Numerical Integration:** Gaussian quadrature formula, Trapezoidal rule, Simpson’s 1/3\textsuperscript{rd} rule and Simpson’s 3/8\textsuperscript{th} rule

**UNIT-IV (9+3)**

**Solution to System of Linear Equations:** Gaussian elimination method, Jacobi Method and Guass-Siedel iteration method

**Numerical Solution of Algebraic and Transcendental Equations:** Bisection method, Regula-Falsi method and Newton Raphson’s method

**Numerical Solution of Ordinary Differential Equations:** Taylor’s method, Picard’s method, Euler’s method and Runge-Kutta methods of second and fourth order

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**Text Book:**

**Reference Books:**

**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to…

CO1: solve wave equation, heat conduction equation and Laplace equation using Fourier series

CO2: find correlation regression coefficients, fit curves using method of least squares for given data and apply theoretical probability distributions in decision making

CO3: estimate value of a function by applying interpolation formulae

CO4: apply numerical methods to solve simultaneous algebraic equations, differential equations, find roots of algebraic and transcendental equations

**Course Articulation Matrix: U18OE401A APPLICABLEMATHEMATICS**

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18OE401C  ELEMENTS OF MECHANICAL ENGINEERING

Class: B. Tech.IV-Semester  Branch: Common to all branches
Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on …
LO1  : types of materials, design methodology and elements of power transmission
LO2  : different manufacturing processes and their applications
LO3  : laws of thermodynamics and types of systems
LO4  : principle and applications of SI &CI engines

UNIT- I (12)

Engineering Materials: Classification, properties and applications
Design Criterion: Discrete steps in engineering design process
Power Transmission: Classification, flat belt drives - length of open and cross belts, belt tensions and power transmitted, Gears-types and applications, spurgear-nomenclature
Bearings: Types – sliding& rolling contact bearings and applications.

UNIT- II (12)

Manufacturing Processes: Classification, Foundry- steps in sand casting process, pattern-types, materials and allowances, mould cross section, moulding sand-composition and properties, Machining: lathe machine-line diagram and operations, Welding-classification, principle of arc welding- AC and DC welding, principle of gas welding, principle of brazing andsoldering, Metal forming process: forging, rolling, extrusion

UNIT- III (12)

Thermodynamics: System-types, state, property, process and cycle, Energy-property, Zeroth law, thermodynamic equilibrium, laws of perfect gases
Law of Thermodynamics: First law- applied to a cycle, change of state, internal energy, enthalpy, work and heat in closed systems- isobaric, isochoric, isothermal, adiabatic and polytropic, PMM-I, limitations of first law ofthermodynamics

UNIT- IV (12)

Second Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence, Carnot cycle, Carnot theorem, heat engine, heat pump and refrigerator, working principle of domestic air conditioner-line diagram
IC Engines: Classification, working principle of four and two stroke SI and CI engines

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Book:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: *explain mechanical properties of an engineering materials and learn the steps in design methodology*
CO2: *describe the principles of manufacturing processes*
CO3: *apply first law of thermodynamics to various processes to calculate work and heat for a closed system*
CO4: *define second law of thermodynamics and demonstrate the working principle of IC engines*

Course Articulation Matrix: U18OE401C  ELEMENTS OF MECHANICAL ENGINEERING

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U18OE401E  FUNDAMENTALS OF COMPUTER NETWORKS

Class:  B. Tech. IV-Semester  Branch:  Common to all branches

Teaching Scheme:  

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Examination Scheme:

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<tr>
<td>End Semester Examination</td>
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Course Learning Objectives (LOs):
This course will develop students' knowledge in/on …
LO1:  network topologies, network reference models, network architecture and data transmission
LO2:  design issues and protocols of data link layer, error detection and correction, MAC protocols and ethernet standards
LO3:  principles and design issues of network layer and internet protocols
LO4:  transport layer design issues, protocols and application layer services

UNIT - I (9)

Introduction:  History of computer networks and the internet, principles of computer network design, network architecture, network types

Physical Layer:  Factors Affecting data transmission, data transmission, data transmission codes: non-return to zero, Manchester encoding, digital modulation & modems, transmission media

UNIT- II (9)

Data Link Layer:  Functions of data link layer, framing techniques, error detection and correction, elementary data link layer protocols for flow control


UNIT - III (9)

The Network Layer:  Network layer services, packet switching networks, the Internet Protocol(IP): IP header in IPv4, IP addressing in IPv4, Subnet addressing and Classless Inter-Domain Routing (CIDR), address resolution protocol, dynamic host configuration protocol, internet layer protocols, fragmentation and reassembly, IP Version 6: motivation for IPv6 development, features of IPv6, IPv6 Address Representation

Routing Protocols:  Elements of routing protocol performance, flooding, distance-vector and link state routing protocols, hierarchical routing

UNIT - IV (9)

The Transport Layer:  User datagram protocol, transmission control protocol, TCP state transition diagram, other TCP timers, TCP congestion control

The Application Layer:  World Wide Web, Domain Name System, Electronic Mail

Network Security:  Threats and vulnerabilities in computer networks, cryptographic algorithms, data encryption standard

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Book:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: describe various network topologies, architecture and techniques for data transmission modes
CO2: outline various design issues in data link layer and develop protocols to handle data link layer operation
CO3: describe various design issues and develop protocols for network layer
CO4: explain various design issues, protocols of transport layer & application layer services

Course Articulation Matrix: U18OE401E FUNDAMENTALS OF COMPUTERNETWORKS

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# U18MH402  PROFESSIONAL ENGLISH

**Class:** B. Tech.IV-Semester  
**Branch:** Common to all branches  

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## Course Learning Objectives (LOs):

This course will develop students’ knowledge in / on …

- **LO1**: reading skill and sub skills to comprehend the text
- **LO2**: vocabulary and using it appropriately to describe situations
- **LO3**: using phrasal verbs in speech and writing
- **LO4**: grammar and improve language ability to write effectively

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| I    | I. **Reading Comprehension**- Significance of Reading Skimming  
      | II. **Verbal Ability**- Synonyms  
      | III. **Grammar**- Articles |
| II   | I. **Reading Comprehension**- Scanning  
      | II. **Verbal Ability**- Antonyms  
      | III. **Grammar**- Articles |
| III  | I. **Reading Comprehension**- Critical Reading  
      | II. **Verbal Ability**- Sentence completion with correct alternative word/group  
      | III. **Grammar**- Prepositions |
| IV   | I. **Reading Comprehension**- Intensive Reading  
      | II. **Verbal Ability**- Sentence completion with correct alternative word/group  
      | III. **Grammar**- Reported Speech |
| V    | I. **Reading Comprehension**- Intensive Reading  
      | II. **Verbal Ability**- Jumbled Sentences  
      | III. **Grammar**- Error Detection |
| VI   | I. **Reading Comprehension**- Inferential Reading  
      | II. **Verbal Ability**- Jumbled Sentences  
      | III. **Grammar**- Error Detection |
| VII  | I. **Reading Comprehension**- Lexical Reading  
      | II. **Verbal Ability**- Phrasal Verbs  
      | III. **Grammar**- Tenses, Structures |
| VIII | I. **Reading Comprehension**- Read to Interpret  
      | II. **Verbal Ability**- Single Word Substitutes  
      | III. **Grammar**- Tenses, Uses |
| IX   | I. **Reading Comprehension**- Read to Analyze  
      | II. **Verbal Ability**- Collocations  
      | III. **Grammar**- Tenses, Uses |
| X    | I. **Reading Comprehension**- Read to Summarize  
      | II. **Verbal Ability**- Spellings  
      | III. **Grammar**- Agreement between Subject & verb (concord) |

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**Text Books:**

*KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme*
1. Professional English Manual, Department of English, KITSW

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: analyze the passage using skill and sub skill to solve different types of questions related to reading comprehension
CO2: identify grammatical errors in the given sentences and correct them
CO3: select correct synonyms/antonyms/phrasal verbs and complete sentences with suitable words or phrases
CO4: keep the given jumbled sentences in proper sequence to make a coherent paragraph

Course Articulation Matrix: U18MH302/402 PROFESSIONAL ENGLISH

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U18OE403A OBJECT ORIENTED PROGRAMMING

Class: B. Tech.IV-Semester  Branch: Common to all branches

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks  |

Course Learning Objectives (LOs):
This course will develop students’ knowledge in / on …
LO1: Fundamentals of object oriented and java programming
LO2: Classes, objects and inheritance for implementing object oriented concepts
LO3: Polymorphism, interfaces and packages for realizing object oriented programming
LO4: Manage Exceptional and I/O operations in application developments

UNIT- I (9)

Fundamentals of Object-Oriented Programming: Programming paradigms, basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP

Basics of Java Language: Java language Features, Java programming structure, Java tokens, JVM, constants, variables, data types, scope of variable, type casting, operators and expressions, branching and looping statements, arrays

UNIT – II (9)

Classes and Objects: Defining a class, field declaration, method declaration, creating object, accessing class members, constructors, garbage collection, static members, nested and inner classes, command line arguments, wrapper classes

Inheritance: Extending a class, defining subclasses, subclass constructor, multilevel inheritance, hierarchical inheritance, access controls, this and super keywords

UNIT-III (9)

Polymorphism: Overloading methods, overloading constructors, overriding methods, dynamic method dispatch, abstract classes, final keyword

Interfaces: Defining an interface, implementing interfaces, nested interfaces, variables in interfaces, extending interfaces

Packages: Packages, Java API packages, using system packages, naming conventions, creating packages, accessing packages, adding a class to package, hiding classes, static import

UNIT – IV (9)

Exception handling: Fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, explicit exceptions with throw, throws and finally keywords

String Handling: String constructors, string length, string operations, character extraction, string comparison, searching string, modifying string, changing string cases, joining strings

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
**Using I/O:** I/O basics, reading console input, writing console output, reading and writing files

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**Text Books:**

**References Books:**

**Course Learning Outcomes (COs):**
On completion of this course, the students will be able to…

- **CO1:** demonstrate object oriented concepts and java programming features
- **CO2:** solve computing problems using object orientation and inheritance concepts
- **CO3:** use polymorphism, interfaces and Packages for effective object oriented programming
- **CO4:** handle Exceptions and I/O operations in application development

**Course Articulation Matrix: U18OE303/U18OE403 OBJECT ORIENTED PROGRAMMING**

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18OE403B FLUID MECHANICS AND HYDRAULIC MACHINES

Class: B. Tech.IV-Semester  Branch: Common to all branches
Teaching Scheme:  Examination Scheme:
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Course Learning Objectives (LOs):
This course will develop students’ knowledge in /on …
LO1 : various Properties of fluids and fluid statics
LO2 : application of Bernoulli’s equation and dimensional analysis
LO3 : flow through pipes and working principles of hydraulic turbines
LO4 : performance of reciprocating and centrifugal pumps

UNIT-I (9)
Fluid fundamentals: Classification of fluids, fluid properties - density, specific weight, specific gravity, specific volume, viscosity, capillarity, vapor pressure, compressibility, surface tension, cohesion and adhesion
Fluid statics: Pascal’s Law, hydrostatic Law, measurement of pressure, manometers, piezometer, U-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, buoyancy, metacenter, stability of floating and submerged bodies

UNIT-II (9)
Fluid dynamics: Classification of fluid flow, continuity equation in one, two and three dimensional flow, velocity potential and stream function, forces causing motion, Euler’s equation of motion, Bernoulli’s Equation, applications of Bernoulli’s equation, venturi meter, orifice meter, pitot tube, linear momentum equation, application of linear momentum equation to forces on pipe bend
Dimensional analysis: Dimensional analysis by Rayleigh’s method and Buckingham r’s theorem, dimensionless numbers and model laws, Reynolds law and Froude’s law

UNIT-III (9)
Flow through pipes: Loss of head in pipes, expression for head loss due to major and minor losses in pipes, HGL and TEL lines, pipes in series and parallel, equivalent pipe
Hydraulic turbines: Concept of impact jets, classification, head, losses and various efficiencies, Pelton turbines, components, velocity triangles, power and efficiencies, reaction turbines, Francis and Kaplan turbines, efficiencies and characteristics, unit quantities, specific speed, draft tube theory

UNIT-IV (9)
Reciprocating pumps: Working of single and double acting pumps, work done and efficiencies, slip, negative slip, performance characteristics of pumps, air vessel
Centrifugal pumps: Principle, components, work done and efficiency, pumps in series and in parallel, multi stage pumps, characteristics, cavitation and priming

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: summarize fluid properties using fundamental laws of fluid statics
CO2: analyse fluid flows using Bernoulli’s equation and model laws
CO3: estimate losses in pipes and characterize hydraulic turbines
CO4: discuss the working principle and characteristics of pumps

Course Articulation Matrix: U18OE403B FLUID MECHANICS AND HYDRAULICMACHINES

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18OE403C MECHATRONICS

Course Learning Objectives (LOs):
This course will develop students’ knowledge in/on…
LO1: role of mechatronics-based technology, sensors and transducers used in industry
LO2: various types of actuation systems, working principles and their applications
LO3: mathematical models for various types of systems
LO4: various transfer functions and control modes

UNIT-I (9)
Introduction to Mechatronics: Measuring system, control systems, microprocessor based controllers, mechatronics approach
Sensors and Transducers: Performance, terminology, displacement, position, proximity, velocity and motion

UNIT-II (9)
Actuation Systems: working principles of pneumatic and hydraulic systems, directional control valves, pressure control valves, process control valves and rotary actuators
Electrical Actuation Systems: working principles of electrical system, mechanical switches, solid-state switches solenoids, DC motors, AC motors and stepper motors

UNIT-III (9)
Basic Models: Mathematical models, mechanical system building blocks, electrical system building blocks, fluid system building blocks and thermal system building blocks
System Models: Engineering system, rotational-translational system and electro-mechanical systems and hydraulic-mechanical system

UNIT-IV (9)
System Transfer functions: Transfer function, first order system, second order system, system in series and systems with feedbackloops
Closed Loop Controllers: Continuous and discrete processes, control modes, two step mode and proportional mode, derivative control, integral control, PID controller, digital controllers, velocity controllers and adaptive control

Text Book:

Reference Books:
KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme

**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to...

- **CO1:** apply the mechatronics approach ad select suitable sensors and transducers for a given application
- **CO2:** explain working principles of mechanical, hydraulic, pneumatic and electrical actuators and their applications
- **CO3:** develop basic building blocks for mechanical, electrical, fluid and thermal systems and build mathematical models and analyze
- **CO4:** explain various system transfer functions and select an appropriate closed loop controller for a given application

**Course Articulation Matrix: U18OE403C MECHATRONICS**

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18OE403D WEB PROGRAMMING

Class: B. Tech.IV-Semester  Branch: Common to all branches

Teaching Scheme:  Examination Scheme:

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Course Learning Objectives (LOs):
This course will develop students’ knowledge in/on …

LO1: designing static webpage using HTML Tags, CSS properties, interactivity with JavaScript
LO2: creating dynamic webpage using JSP
LO3: developing server-side scripts for web applications using PHP
LO4: building databases applications using PHP, MYSQL and XML

UNIT-I (9)

HTML: Document structure, basic tags, creating headings, working with links, creating paragraph, working with images, tables, frames, Introduction to forms and controls: creating HTML form, specifying action URL and method to send the form, using HTML controls

CSS: CSS (Cascading style sheet) rules and properties, types: inline, external and internal style sheets, style classes, multiple styles

JAVASCRIPT: JavaScript syntax, embedding JavaScript in HTML page. usage of variables, working with operators, control-flow statements, functions and array, creating objects, handling events

UNIT-II (9)

JSP: Syntax and semantics, JSP development model, components of JSP page: directives, comments, Expressions, Scriptlets, declarations, implicit objects, standard actions, tag extensions, a complete JSP example, Session and thread management: session tracking, session API, thread management, application event listeners

JDBC: Database access with JDBC, overview, JDBC drivers, connecting to database with driver manager, statement interfaces: statement, prepared statement, callable statement, result sets

UNIT-III (9)

Introduction to PHP: Overview of PHP, advantages of PHP over scripting languages, creating and running a php script, handling errors, working with variables and constants: variables, data types and operators, Controlling

Program Flow: Conditional Statements, looping statements, break, continue and exit statements, Working with functions, arrays, files and directories

Working with Forms: Web forms and form elements, processing a web form, validating a web form

UNIT-IV (9)

Database using PHP: Exploring relational database model, records and primary keys, working with SQL statements. Using PHP and MYSQL: checking configuration, connecting to database, selecting a
database, adding and altering a table in a database, inserting and modifying data in a table, retrieving data from a table

**XML:** Introduction to XML, XML basics: syntax, declaration, elements, attributes, Valid XML Documents, Viewing XML, XML Parser, XML technologies, Document Object Model(DOM)

******

**Text Books:**


**Reference Books:**


**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to…

**CO1:** create static web pages using HTML Tags, CSS properties and Java scripts

**CO2:** create dynamic web pages using java server page concepts

**CO3:** develop web server side applications using PHP concepts

**CO4:** develop enterprise databases for web-based applications using PHP and MySQL

**Course Articulation Matrix: U18OE403D WEB PROGRAMMING**

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U18OE403F  STRENGTH OF MATERIALS

Class: B. Tech. IV-Semester  Branch: Common to all branches
Teaching Scheme:  Examination Scheme:

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Course Learning Objectives (LOs):
This course will develop students’ knowledge in/on …

LO1: behaviour of bodies subjected to various types of stresses and strains
LO2: shear force and bending moment for determinate beams
LO3: bending and shearing stresses for beams in flexure
LO4: behaviour of circular shafts, springs and thin cylinders

UNIT-I (9)

Simple stresses and strains: Types of stresses, strains, stress-strain diagram, elastic limit, Hooke’s law, bars of varying sections, uniformly tapering circular and rectangular sections, elongation of bars due to self weight, temperature stresses in uniform bars

Elastic modulii: Elastic constants, longitudinal strain, lateral strain, Poisson’s ratio, complimentary shear stress, state of simple shear, modulus of elasticity (E), modulus of rigidity (N), bulk modulus (K), relation between E, N & K, strain energy, resilience, impact loading

UNIT-II (9)

Principal stresses: Definition, normal and shear stress, principal stresses, principal planes and their graphical representation by Mohr’s circle

Shear force and bending moment: Types of supports, classification of beams, concept of shear force and bending moment, shear force diagram and bending moment diagram for simply supported, cantilever and overhanging beams, loading from shear force and bending moment diagram, principle of superposition

UNIT-III (9)

Bending stresses in beams: Assumptions, theory of simple bending, application of bending equation and calculation of bending stresses in beams of homogeneous and flitched beam material, beams of uniform strength

Shearing stresses in beams: Shearing stress due to bending, variation of flexural shear stress distribution across rectangular, triangular, circular, flanged section, shear resilience

UNIT-IV (9)

Circular shafts and springs: Theory of pure torsion in solid and hollow circular shafts, shear stresses, angle of twist, power transmitted by shaft, close-coiled and open-coiled helical spring subjected to axial load and axial twist, springs in series and parallel

Thin cylinders: Analysis of thin walled pressure vessels, hoop stress, longitudinal stress

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: estimate various types of stresses and strains
CO2: construct Mohr’s circle, shear force and bending moment diagrams for determinate beams
CO3: determine the bending and shearing stresses for beams subjected to pure bending
CO4: analyze stresses in thin cylinders, circular shafts and springs by theory of pure torsion

Course Articulation Matrix: U18OE403F  STRENGTH OF MATERIALS

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U18EE404 POWER SYSTEMS -I

Class: B. Tech.IV-Semester  
Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):

This course will develop students’ knowledge in / on …

LO1: issues related to generation of electrical energy using fossil fuel based and renewable energy sources
LO2: economics of power generation and tariffs
LO3: underground cables and voltage distribution on insulators
LO4: parameters of transmission lines

UNIT – I (9)


UNIT – II (9)

Renewable Energy Sources: Introduction to solar power, wind power

Economics of Power Generation: Definitions, connected load, maximum demand, demand factor, load factor, diversity factor, load duration curve, number and size of generating units, base load and peak load plants, cost of electrical energy, fixed cost, running cost, tariffs

UNIT – III(9)

Insulators: Types, potential distribution over a string of suspension insulators, factors affecting the distribution of voltage along the string insulators, methods of equalizing potential string efficiency, stringing charts, testing of insulators

Under Ground cables: Electric stress in a cable, grading of cables, cable capacitance, cable inductance, dielectric loss and heating

UNIT – IV (9)

Distribution Lines: Distribution systems, DC two wire and three wire systems. single phase and three phase 3-wire and 4-wire AC systems - comparison of efficiency, Kelvin’s law - economic size of conductor

Transmission Lines: Calculation of resistance, inductance and capacitance of transmission lines, single phase and 3-phase lines with symmetrical and asymmetrical spacing, composite conductors - transposition, bundled conductors, effect of earth on capacitance, mechanical design of transmissionlines
******

Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: describe the operation of fossil fuel based and renewable generating stations
CO2: analyze different types of tariff’s in power system
CO3: determine distribution of voltage along the string insulators
CO4: determine circuit parameters of transmission lines

Course Articulation Matrix: U18EE404  POWER SYSTEMS - I

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U18EE405 ELECTRICAL MACHINES -I

Class: B. Tech.IV-Semester
Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on …

LO1: basic principles of magnetic circuits, electro mechanical energy conversion and construction of electrical machines
LO2: principle, effects of armature reaction, commutation, characteristics and applications of DC generators
LO3: principle, characteristics, starting, speed control, testing and applications of DC motors
LO4: principle, construction, testing and applications of 1-phase and 3-phase transformers

UNIT – I (9+3)

Magnetic circuits and basic principles of rotating electrical machines: Principles of electromechanical energy conversion, singly and doubly excited systems, basic constructional features of rotating electrical machines

UNIT – II (9+3)

DC Generators: Principle of operation, armature windings, simplex and multiplex lap and wave windings (elementary treatment), types of DC generators, EMF equation, armature reaction-demagnetizing and cross magnetizing ampere turns, interpoles, compensating windings, commutation-reactance voltage, methods of improving commutation, methods of excitation, separately and self-excited generators, voltage buildup process in shunt generators, critical field resistance and critical speed, characteristics & applications of shunt, series & compound generators

UNIT – III (9+3)

D.C. Motors: Principle of operation, back emf, torque equation, classification, starters (3 point & 4-point), operating characteristics and speed control, applications, losses, efficiency and testing of dc machines- brake test, Swinburne’s test, Hopkinson’s test, Field’s test

UNIT – IV (9+3)

Single Phase Transformers: Constructional features, principle of operation, EMF equation, operation on no-load and on-load, development of equivalent circuit, determination of equivalent circuit parameters, phasor diagrams, losses, ordinary efficiency and all day efficiency, voltage regulation, determination of performance by Open Circuit (OC), Short Circuit (SC) tests and Sumpner’s test, parallel operation, load sharing, auto transformer- principle of working, saving of copper as compared to two winding transformer and applications

Three Phase Transformers: Types of connections, relation between line and phase voltages and currents, three winding transformer, use of tertiary winding, Scott connection of transformers, tap changing of transformers- off-load and on-load, induction regulator

*****

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: analyze the principles of magnetic circuits, electro mechanical energy conversion and understand construction of electrical machines

CO2: analyze the effects of armature reaction, commutation and calculate demagnetizing (ATd), cross magnetizing (ATc) ampere turns, critical field resistance and critical speed for DC generators

CO3: compare various speed control methods and determine efficiency of DC machines by different testing methods

CO4: evaluate the performance of 1-phase transformers and distinguish various connections of 3-phase transformers and its applications

Course Articulation Matrix: U18EE405 ELECTRICAL MACHINES – I

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EC412 ANALOG AND DIGITALELECTRONICS

Class: B. Tech.IV-Semester Branch: Electrical & Electronics Engineering
Teaching Scheme: Examination Scheme:
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Continuous Internal Evaluation 40 marks
End Semester Examination 60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on …

LO1: single stage amplifiers, multistage amplifiers
LO2: power amplifiers, feedback amplifiers and oscillator circuits analysis
LO3: number systems, codes and Boolean algebra
LO4: combinational circuits and sequential circuits

UNIT-I (9)

Small Signal Amplifiers: Review of BJT biasing and operating point, Analysis of BJT small signal low frequency h-parameter model - CE, CB and CC configurations, High frequency transistor amplifier - analysis of the Hybrid- (pi) Common Emitter transistor model

Multistage Amplifiers: RC coupled Amplifier, Direct and Transformer Coupled Amplifiers, effect of cascading on gain and bandwidth, Darlington Pair, cascade amplifier, differential amplifier and bootstrap amplifier

UNIT-II (9)

Large Signal Amplifiers: Series fed and Transformer coupled Class-A, Class-B power amplifiers, Class-AB power amplifiers, Push-Pull amplifier and Complementary-Symmetry pair

Feedback Amplifiers: General characteristics of negative feedback amplifiers, Effect of negative feedback on amplifier characteristics, Analysis of Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback amplifiers

Oscillators: Conditions for oscillation, RC and LC oscillators, Crystal Oscillator

UNIT-III (9)

Number systems and Codes: Review of number systems, binary arithmetic, binary weighted and non-weighted codes, error detecting and error correcting codes

Boolean Algebra: Postulates and theorems, logic gates and truth tables, representation, minimization and realization of switching functions, SOP & POS forms, minimization using Karnaugh map and Quine - McClusky Techniques

UNIT-IV (9)

Combinational circuits: Design of combinational circuits using logic gates – Half adder, Full adder, Half subtractor, Full subtractor, Parallel adder, Serial adder, Carry look ahead adder, BCD adder, 1’s and 2’s Complement Adder/Subtractors, Decoders - BCD to 7 segment, BCD to Decimal decoders, Encoders-Priority encoders, Multiplexers, Demultiplexers, Realization of switching functions using multiplexers and decoders, Parity generators, Comparators

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
**Sequential circuits:** Flip flops – SR, JK, D and T Flip flops, Truth tables, Excitation tables, Race around condition, Master slave flip flop, Binary counters – Design of synchronous and Asynchronous counters, Shift registers – Modes of operation, Bidirectional shift registers, Ring counter and Johnson counter

**Text Books:**

**Reference Books:**

**Course Learning Outcomes (COs):**
On completion of this course, the students will be able to…

CO1: design single stage and multistage amplifiers

CO2: analyze feedback amplifier, power amplifiers and design the oscillators circuits

CO3: implement the error detection, correction codes and minimize the Boolean functions

CO4: realize the combinational and sequential circuits

**Course Articulation Matrix: U18EC412 ANALOG AND DIGITAL ELECTRONICS**

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Course Learning Objectives (LOs):
This laboratory course will develop students’ knowledge in / on …
LO1 : performance characteristics of DC machines by conducting various tests
LO2 : predetermination of performance of DC motors and transformer
LO3 : performance characteristics of 1- phase transformers by conducting various tests
LO4 : understanding of connections of 3- phase transformers

LIST OF EXPERMENTS
1. Determination of open circuit characteristics of DC shunt generator
2. Determination of load characteristics of DC shunt generator
3. Determinations of performance characteristics of DC shunt motor by braketest
4. Determination of performance characteristics of DC series motor by braketest
5. Determination of performance characteristics DC compound motor by braketest
6. Predetermination of efficiency of DC machine by Swinburne’s test
7. Speed Control of DC Shunt motor using i). Armature voltage control, ii). Field fluxcontrol
8. Determination of voltage regulation and efficiency of 1-phase transformer by conducting load test
9. Predetermination of efficiency of 1-phase transformer by open circuit and short circuit tests
10. Determination of efficiency of 1-phase transformer by conducting Sumpner’s test
11. Parallel operation of two 1-phase transformers
12. Conversion of 3-phase to 2-phase supply by using Scott connection

Additional Study Experiments
1. Study of DC Starters
2. Study of constructional parts of DC machines
3. Study of constructional parts of 1-phase transformers
4. Study of constructional parts of 3-phase three winding transformer

Laboratory Manual
1. Electrical Machines -I Laboratory Manual, Department of EEE, KITSW

Reference Book:
KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme

**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to…

- **CO1**: obtain performance characteristics of DC generators
- **CO2**: determine performance characteristics of DC motors and transformers
- **CO3**: predetermine the performance characteristics of DC machines using Swinburne’s test and transformers using OC, SC tests
- **CO4**: acquire hands-on experience on connections of 3-phase transformers

**Course Articulation Matrix: U18EE407 ELECTRICAL MACHINES -I LABORATORY**

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U18EC413 ANALOG AND DIGITAL ELECTRONICS LABORATORY

Class: B. Tech.IV-Semester
Branch: Electrical & Electronics Engineering

Teaching Scheme: Examination Scheme:

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Course Learning Objectives (LOs):
This laboratory course will develop students’ knowledge in/on …

LO1: analysis of single & multistage amplifier circuits
LO2: constructing the Negative feedback amplifiers and oscillators
LO3: realizing combinational circuits
LO4: implementing sequential circuits

LIST OF EXPERIMENTS

I) Analog Electronics:
   1. Common Emitter Amplifier
   2. Two Stage RC Coupled Amplifier
   3. Voltage Series Feedback Amplifier
   4. RC Phase Shift Oscillator
   5. Single Tuned Voltage Amplifier
   6. Class A Power Amplifier (with transformer load)

II) Digital Electronics:
   1. Realization of Logic Gates.
   2. Adders and Subtractors.
   3. BCD to Excess-3 code converter and Binary to Gray code converter.
   4. Multiplexer and Demultiplexer.
   5. Decoders and Encoders.
   6. Flipflops.
   7. Shift registers.
   8. Asynchronous and Synchronous counters.

Laboratory Manual:
   1. Analog and Digital Electronics Laboratory manual, Department of ECE, KITSW.

Reference Books:
Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: design and analyze single stage and multistage amplifier circuits.
CO2: design and analysis of Negative feedback amplifiers and oscillators
CO3: design and verify the combinational circuits
CO4: design and implement sequential circuits

Course Articulation Matrix: U18EC413 ANALOG AND DIGITAL ELECTRONICS LABORATORY

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U18OE411A  OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B. Tech.IV-Semester  Branch: Common to all branches

Teaching Scheme:  Examination Scheme:

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Continuous Internal Evaluation  40 marks
End Semester Examination  60 marks

Course Learning Objectives (LOs):
This laboratory course will develop students’ knowledge in/on …

LO1 : implementing concepts of object oriented programming
LO2 : debug and test java applications effectively
LO3 : effective use of exception handling, interfaces and packages during applications development
LO4 : I/O and applet programming in java

LIST OF EXPERIMENTS

Experiment -I
1. Write a program to demonstrate operators of java
2. Write a program to demonstrate type casting and operator precedence
3. Write a program to demonstrate different types of if-statements
4. Write a program to demonstrate switch-case

Experiment -II
1. Write a program to demonstrate loop control statements
2. Write a program to demonstrate for-each control loop
3. Implement programs using single dimensional arrays
4. Write a program to define a two dimensional array where each row contains different number of columns

Experiment -III
1. Write a program to demonstrate creating object to a class for accessing variables and methods
2. Write a program to demonstrate creating multiple object
3. Write a program to demonstrate passing objects to methods
4. Write a program to demonstrate constructors and garbage collector by invoking it explicitly

Experiment -IV
1. Write a program to demonstrate static members
2. Write a program to demonstrate command line argument
3. Write a program to demonstrate variable length argument
4. Write a program to demonstrate wrapper classes

Experiment -V

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
1. Write a program to demonstrate inheritance using extends keyword
2. Write a program to demonstrate multilevel inheritance
3. Write a program to demonstrate hierarchical inheritance
4. Write a program to demonstrate access controls

**Experiment - VI**

1. Write program to demonstrate this and super keywords
2. Write program to demonstrate dynamic method dispatch
3. Write a program to demonstrate final variable and methods
4. Write a program to demonstrate use of abstract class

**Experiment - VII**

1. Write a program to define an Interface and implement it into a class
2. Write a program to implement multiple interfaces into single class
3. Write a program to extend interfaces
4. Write a program to implement nested interfaces

**Experiment - VIII**

1. Write a program to create a package, and demonstrate to import a package to a class
2. Write a program to demonstrate access protection of packages
3. Write a program to demonstrate static import of package

**Experiment - IX**

1. Write a program to demonstrate try and catch statement for exception handling
2. Handle Array Index of Bounds Exception, Number Format Exception and Divide By Zero Exception using multiple catch blocks
3. Write a program to demonstrate user defined exception with throw keyword
4. Write a program to demonstrate finally block

**Experiment - X**

1. Write a program to demonstrate string handling functions
2. Write a program to demonstrate string searching functions
3. Write a program to demonstrate string comparison functions
4. Write a program to demonstrate string modification functions

**Experiment - XI**

1. Write a program to demonstrate reading and writing input using byte stream classes
2. Write a program to demonstrate reading and writing input using character stream classes

*KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme*
3. Write a program to demonstrate data input and output streams
4. Write a program to demonstrate array input and output streams

Experiment-XII

1. Write a program to create a file using byte stream classes
2. Write a program to create a file using character stream classes
3. Write a program to open the specific file
4. Write a program to copy the content of one file to another

******

Laboratory Manual:
1. Java Programming Laboratory Manual, Department of CSE, KITSW.

Reference Book:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: implement OOP concepts using Java
CO2: use the concepts like inheritance, polymorphism, packages and interfaces in application development
CO3: handle runtime exceptions in object oriented programming
CO4: build effective I/O interfaces for software applications

Course Articulation Matrix: U18OE411A OBJECT ORIENTED PROGRAMMING LABORATORY

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U18OE411B FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Class: B. Tech.IV-Semester

Teaching Scheme:

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Branch: Common to all branches

Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):

This laboratory course will develop students’ knowledge in/on …

- **LO1**: determining the hydraulic coefficient for various flow measuring devices
- **LO2**: implementing Bernoulli’s equation and application of Bernoulli’s theorem in estimating various losses in pipe
- **LO3**: studying the various parameters which effects the impact of jet
- **LO4**: studying the characteristics of hydraulic machines

LIST OF EXPERIMENTS

1. Determination of Coefficient of Discharge for given Orifice meter and Venturi meter
2. Determination of Coefficient of Discharge for given notches (triangular/rectangular)
3. Determination of Coefficient of Discharge for given orifice and mouth piece
4. Verification of Bernoulli’s theorem
5. Estimation of coefficients of various head losses in pipes due to major and minor losses (sudden enlargement, sudden contraction and bend)
6. Determination of Reynolds’s number using Reynolds’s apparatus
7. Determination of coefficient of impact for a jet on given vane
8. Determination of performance characteristics of Francis Turbine
9. Determination of performance characteristics of Pelton Wheel
10. Determination of performance characteristics of Centrifugal Pump
11. Determination of performance characteristics of Submersible Pump
12. Determination of performance characteristics of Reciprocating Pump

Laboratory Manual:

1. *Fluid Mechanics Laboratory Manual*, Department of CE, KITSW.

Reference Books:


Course Learning Outcomes (COs):

*KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme*
On completion of this course, the students will be able to…

CO1: determine the hydraulic coefficient for various flow measuring devices
CO2: apply Bernoulli’s equation in estimating head loss in pipes
CO3: apply the principles of impact of jet on different vanes
CO4: demonstrate the characteristics of hydraulic machines

### Course Articulation Matrix: U18OE411B FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

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U18OE411C MECHATRONICS LAB

Class: B. Tech.IV-Semester
Branch: Common to all branches

Teaching Scheme:

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Examination Scheme:

- Continuous Internal Evaluation: 40 marks
- End Semester Examination: 60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students’ knowledge in /on …

LO1: basic elements underlying mechatronic systems: analog electronics, digital electronics, sensors, transducers, actuators, microcontrollers and embedded software

LO2: interface of various systems to a PLC

LO3: integration of various systems through programming

LO4: design and simulation of hydraulic and pneumatic circuits

LIST OF EXPERIMENTS

1. Controlling A.C. Non servomotor clockwise and anti clockwise with timedelay
2. Controlling A.C. Non servo motor using digital inputs proximity sensors
3. Controlling of Single acting Pneumatic Cylinder with timedelay
4. Controlling of double acting Pneumatic Cylinder with time delay and sequencing
5. Control of D.C Servomotor (rotating table clockwise and counterclockwise)
6. Integration of AC Non servo motors, single acting pneumatic cylinder and double acting pneumatic cylinder
7. Integration of AC Non-servomotor and pneumatic cylinders with digital inputs
8. Controlling of X table and Y table
9. Controlling of various systems using manual input
10. Controlling of traffic lights with timedelay
11. Controlling of lift operations with timedelay
12. Hydraulic and Pneumatic simulation

********

Laboratory Manual:

1. Mechatronics Lab Manual, Department of ME, KITSW

Reference Books:

### Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

**CO1:** develop PLC program to control AC non servomotors, single acting and double acting pneumatic cylinders with different operation conditions

**CO2:** develop PLC program to control various systems

**CO3:** integrate various mechanical and electrical systems and operate them

**CO4:** design and simulate the hydraulic and pneumatic circuits

### Course Articulation Matrix: U18OE411C MECHATRONICS LAB

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U18OE411D WEB PROGRAMMING LABORATORY

Class: B. Tech.IV-Semester  Branch: Common to all branches
Teaching Scheme: Examination Scheme:

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<tbody>
<tr>
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</table>

Continuous Internal Evaluation 40 marks
End Semester Examination 60 marks

Course Learning Objectives (LOs):
This laboratory course will develop students’ knowledge in/on …
LO1: implementing HTML Tags, CSS and JavaScripts for creating static web pages
LO2: usage of JSP in designing dynamic web pages
LO3: usage of PHP in designing a web base application
LO4: accessing different web data servers using JSP and PHP

LIST OF EXPERIMENTS

Experiment-1

1. Design the following static web pages with the following attributes:
   a. Basic Tags.
   b. Heading Tags.
   c. List (Ordered and Un-Ordered).
   d. Textbox, Buttons.

Experiment-2

2. HTML

AIM: Design the following static web pages required for an online book store web site.
   a. HOMEPAGE:
   b. LOGINPAGE
   c. CATALOGEPAGE

DESCRIPTION:
   a. HOMEPAGE
   The static home page must contain three frames.

   • Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

   • Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link CSE the catalogue for CSE Books should be displayed in the Right frame.

   • Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the website.

<table>
<thead>
<tr>
<th>Logo</th>
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<tbody>
<tr>
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<tr>
<td></td>
<td>Registration</td>
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<tr>
<td></td>
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<td>Cart</td>
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</table>

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
b. LOGIN PAGE: This page looks like below:

<table>
<thead>
<tr>
<th>Logo</th>
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<tbody>
<tr>
<td>Home</td>
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<tr>
<td>CSE</td>
<td>Login : Password:</td>
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<tr>
<td>ECE</td>
<td></td>
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<tr>
<td>EEE</td>
<td></td>
</tr>
<tr>
<td>CIVIL</td>
<td></td>
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</tbody>
</table>

Experiment-3

c. CATOLOGUEPAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- Snap shot of Cover Page.
- Author Name and Publisher.
- Price and Add to cart button.

<table>
<thead>
<tr>
<th>Logo</th>
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<tbody>
<tr>
<td>Home</td>
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<tr>
<td>CSE</td>
<td><img src="image1" alt="XML Bible" /> Book : XML Bible Author : Winston Publication : Wiley</td>
</tr>
<tr>
<td>ECE</td>
<td><img src="image3" alt="AI" /> Book : AI Author : S. Russell Publication : Princeton hall</td>
</tr>
<tr>
<td>EEE</td>
<td><img src="image5" alt="Java 2" /> Book : Java 2 Author : Watson Publication : BPB publications</td>
</tr>
<tr>
<td>CIVIL</td>
<td><img src="image7" alt="HTML in 24 hours" /> Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication</td>
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</table>
3. VALIDATION

AIM: To do validation for registration page using JavaScript.

DESCRIPTION: Write JavaScript to validate the following fields of the above registration page.

a. Name (Name should contain alphabets and the length should not be less than 6 characters).

b. Password (Password should not be less than 6 characters length).

c. E-mail id (should not contain any invalid and must follow the standard pattern (name@domain.com))

d. Phone number (Phone number should contain 10 digits only). Note: You can also validate the login page with these parameters.

4. CSS

AIM: Write a program illustrating various methods in cascading style sheets.

a. Use different font, styles and set a background image

b. Control the repetition of the image

c. Define styles for links

d. Work with layers and add a customized cursor

DESCRIPTION: Design a web page using CSS (Cascading Style Sheets) which includes the following:

a. Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectorsto activate the styles.

b. Set a background image for both the page and single elements on the page. You can define the background image for the page like this:

c. Control the repetition of the image with the background-repeat property. As background-repeat:repeat

d. Define styles for links

e. Work with layers:

f. Add a customized cursor:

Selector {cursor:value}

.xlink {cursor:crosshair}

.hlink{cursor:help}

5. Embedding JavaScript in HTML pages.

6. Design a registration form and validate its field by using JavaScript.
**Experiment-5**

7. To design the scientific calculator and make event for each button using JavaScript.
8. WAP to create popup boxes in JavaScript.
9. Program to create a class calculator that contains an overloaded method called add to calculate the sum of two integers, two float numbers and, one integer and one float.

**Experiment-6**

10. Print current date & time
11. JSP Program to auto refresh a page
12. JSP Program to count no. of visitors on website
13. JSP program for error handling
14. Demonstrate expression tag
15. Detect locale, language settings & local specific time
16. Demonstrate JSP implicit object
17. JSP Program to display given number in words

**Experiment-7**

18. Display the contents of Employee table in a neat format.
20. Enhance the salaries of Employee by 10% who are earning salary greater than 5000 using *Callable Statement*.
21. Delete all students whose marks are below 50% and also display the count.

**Experiment-8**

22. Write a HTML file to create a simple form with 5 input fields (*Name, Password, Email, Pin code, Phone No. and a Submit button*) and demonstrate required field validations to validate that all input fields are required and display error messages if the above validations do not hold.
23. Create a JSP Page with and run in JSP Engines.
24. Demonstrate Session Tracking in JSP.
25. JSP Program to validate username and password

**Experiment-9**

26. Create Database Connectivity with JSP page with different JDBC Drivers.
27. JSP Program to Select record from database
28. JSP Program to Insert a record into the database
29. Create a CRUD operation for JSP Page using MySQL
30. JSP Program to upload file into server
Experiment-10

31. Create a form for your college library entering student details for each student in the college. Validate the form using PHP valuators and display error messages.

32. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the UserName and Password from the database (instead of cookies).

Experiment-11

33. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.

34. Create and delete MYSQL database using PHP.

Experiment-12

35. Create a PHP program to demonstrate opening and closing a file.

36. Create a PHP program to demonstrate reading a file and writing in a file.

*****

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: create the static web pages using HTML Tags and CSS and JavaScripts

CO2: design dynamic web page for web applications using JSP

CO3: develop server side scripts for web base applications using PHP

CO4: design web applications for effective storage and retrieval of data in MySQL using PHP

Course Articulation Matrix: U18OE411D WEB PROGRAMMING LABORATORY

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18OE411F STRENGTH OF MATERIALSLABORATORY

Class: B. Tech.IV-Semester  Branch: Common to all branches
Teaching Scheme:  Examination Scheme:

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Course Learning Objectives (LOs):
This laboratory course will develop students’ knowledge in / on …

LO1: testing of civil engineering materials
LO2: mechanical properties of civil engineering materials
LO3: behavior of civil engineering materials when tested
LO4: codal specifications of various engineering materials

LIST OF EXPERIMENTS

1. Determination of Stress–Strain characteristics of (a) Mild steel and (b) TORsteel
2. Determination of the compressive strength of wood and punching shear strength
3. Determination of the brinell’s hardness numbers for steel, brass and aluminum
4. Determination of the modulus of rigidity by conducting torsion test on solid shaft or hollow shaft
5. Determination of the modulus of rigidity by conducting compression test on spring
6. Determination of the Young’s modulus of the given material by conducting flexural test on simply supported beam
7. Determination of the Young’s modulus of the given material by conducting flexural test on continuous beam
8. Determination of the Young’s modulus of the given material by measuring conducting flexural test on propped cantilever beam
9. Bend and rebend test on steel specimen
10. Shear test for Mild steel specimen
11. Impact test on Metal Specimens using Izod test
12. Impact test on Metal Specimens using Charpy test
13. Demonstration of measuring strains using strain gauges, LVDTs

******

Laboratory Manual:
1. Strength of Materials Laboratory Manual, Department of CE, KITSW

Reference Books:

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme


**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to…

CO1: correlate theory with the testing of engineering materials for quality assessment

CO2: evaluate the mechanical properties of civil engineering materials

CO3: appraise the behavior of civil engineering materials when tested under loads

CO4: realize the specifications recommended by codes to civil engineering materials

**Course Articulation Matrix: U18OE411F STRENGTH OF MATERIALS LABORATORY**

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U18CH416 ENVIRONMENTAL STUDIES

Class: B. Tech.IV-Semester  Branch: Common to all branches
Teaching Scheme: Examination Scheme:
<table>
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<th>T</th>
<th>P</th>
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<td>End Semester Examination</td>
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Course Learning Objectives (LOs):
This course will develop students’ knowledge in / on …
LO1: necessity to use natural resources more equitably
LO2: concepts of ecosystem and the importance of biodiversity conservation
LO3: causes, effects and control measures of various environmental issues
LO4: issues involved in enforcement of environmental legislation

UNIT-I (6)

Introduction - The multidisciplinary nature of environmental studies - definition, scope and importance. Natural Resources: Forest Resources - Use and over-exploitation of forests, deforestation, timber extraction, mining, dams - their effects on forests and tribal people, Water Resources - Use and over-utilization of surface and ground water, floods, drought, conflicts over water, Mineral Resources - Environmental effects of extracting and using mineral resources, Agricultural Land - Land as a resource, land degradation, soil erosion and desertification, Food Resources - World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging and salinity, Energy Resources - Renewable and non-renewable energy sources, use of alternate energysources

UNIT-II (6)

Ecosystem and Biodiversity: Ecosystem - Concepts of an ecosystem, food chain, food webs, ecological pyramids, energy flow in the ecosystem and ecological succession
Biodiversity and its Conservation - Introduction, definition, genetic, species and ecosystem diversity, value of biodiversity, biodiversity in India, hot spots of biodiversity, man-wildlife conflicts, endangered and endemic species of India, in-situ and ex-situ conservation

UNIT-III (6)

Environmental Pollution: Global climatic change, green house gases, effects of global warming, ozone layer depletion, International conventions/protocols - Earth summit, Kyoto protocol and Montreal protocol, causes and effects of air, water, soil, marine and noise pollution with case studies, solid and hazardous waste management, effects of urban industrial and nuclear waste, natural disaster management- flood, earthquake, cyclone and landslides

UNIT-IV (6)


*****

Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to...

CO1: investigate any environmental issue using an interdisciplinary framework
CO2: formulate an action plan for sustainable alternatives and conserving biodiversity that integrates science, humanist, social and economic perspective
CO3: identify and explain the complexity of issues and processes which contribute to an environmental problem
CO4: participate effectively in analysis and problem-solving through knowledge in environmental legislations

Course Articulation Matrix: U18CH416 ENVIRONMENTAL STUDIES

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
### Course Information

#### Course Details

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**Total Credits for Honours/Minor students:** 19 + 7

### Additional Learning

**Maximum credits allowed for Honours/Minor:**

- **Student Contact Hours/Week:** 25
- **Total Credits:** 19

*List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/Minor Curricula.

Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment; MSE - Mid Semester Examination; ESE - End Semester Examination.

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EE502C: Communication Engineering
U18EE502M: MOOCs Course
U18MH501 / U18MH601 UNIVERSAL HUMAN VALUES – II

Class: B. Tech.V-Semester
B. Tech.VI-Semester

Branch: CE, EIE, EEE, ECE & ECI
ME, CSE, IT & CSN

Teaching Scheme:

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Continuous Internal Evaluation 40 marks
End Semester Examination 60 marks

* Pre-requisite: U18MH111 Universal Human Values - I (Induction Programme)

Course Learning Objectives (LOs):

This course will develop students’ knowledge on /in...

LO1: self-exploration, happiness and prosperity as the process of value education
LO2: harmony in the human being - self & family
LO3: co-existence of human being with society & nature
LO4: professional ethics, commitment and courage to act

UNIT – I (6 + 3)

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Recapitulation from Universal Human Values - I (Induction programme)

Self-Exploration: Its content and process, Natural acceptance and experiential validation – As the process for self-exploration

Continuous Happiness and Prosperity: A look at basic human aspirations, Right understanding, Relationship and physical facility - The basic requirement for fulfillment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly: A critical appraisal of the current scenario, Method to fulfill the above human aspirations - Understanding and living in harmony at various levels

UNIT – II (6 + 3)

Understanding Harmony in the Human Being- Harmony in Myself & Family:

Harmony in Myself: Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ - Happiness and physical facility; Understanding the ‘Body’ as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of ‘I’ with the ‘Body’ - Sanyam and Health; Correct appraisal of physical needs, Meaning of prosperity in detail, Programs to ensure Sanyam and Health

Harmony in Family: Understanding values in human - Human relationship; Meaning of justice (Nine universal values in relationships), Program for its fulfillment to ensure mutual happiness, Trust and respect as the foundational values of relationship, Understanding the meaning of trust, Difference between intention and competence; Understanding the meaning of respect, Difference between respect and differentiation, The other salient values in relationship
UNIT – III (6 + 3)

Understanding Harmony with Society, Nature & Existence:

Understanding the Harmony in the Society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust) and Co-existence as comprehensive human goals, Visualizing a universal harmonious order in society – Undivided society; Universal order - From family to world family

Understanding the Harmony in the Nature: Interconnectedness and mutual fulfillment among the four orders of nature - Recyclability and self-regulation in nature

Whole Existence as Co-existence: Understanding existence as co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – IV (6 + 3)

Implications of Holistic Understanding of Harmony on Professional Ethics:

Natural acceptance of human values, Definitiveness of ethical human conduct, Basis for Humanistic education, Humanistic constitution and Humanistic universal order

Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order  b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems and  c) Ability to identify and develop appropriate technologies and management patterns for above production systems

Case studies: Case studies of typical holistic technologies, Management models and production systems, Strategy for transition from the present state to Universal human order - a) At the level of individual: As socially and ecologically responsible engineers, technologists and managers b) At the level of society: As mutually enriching institutions and organizations

*****

Text Book:

Reference Books:

Additional Resources:
[2] A set of DVDs containing - Video of Teachers’ Orientation Program - PPTs of Lectures and Practice Sessions (Audio-visual material for use in the practice sessions)
Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: interpret the importance of continuous happiness & prosperity through self-exploration and imbibe skills to examine harmony

CO2: appraise the concept of sentience, distinguish between intention & competence and prioritize human values in relationships

CO3: build fearlessness & co-existence as comprehensive human goal and agree upon interconnectedness & mutual fulfillment

CO4: assess the understanding of harmony, adapt professional ethics and take part in augmenting universal human order

Course Articulation Matrix (CAM): U18MH501 / U18MH601 UNIVERSAL HUMAN VALUES - II

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UNIT-I (9)

**Introduction:** Conventional and non-conventional sources of energy – brief description of different renewable energy sources

**Solar energy:** Introduction to prospects of solar PV systems: photovoltaic effect and electrical equivalent circuit of a PV cell, dependence of a PV cell characteristic on temperature, solar cell output characteristics, solar maximum power point tracking (MPPT) using Perturb & Observe algorithm, applications of solar PV systems - street lighting, domestic lighting, solar PV pumping systems

UNIT-II (9)

**Wind energy:** Principles of wind power, evaluation of wind intensity, operation of a wind turbine and wind power curve, different types of wind turbine generators, topography and classification of wind turbines and its applications

Geothermal Energy: Origin and types of geothermal energy, operational difficulties, liquid dominated systems

UNIT-III (9)

**Energy from Oceans:** Ocean temperature differences, ocean waves, energy from the waves, introduction of tidal power, basic principle of tidal power, components of tidal power plants

**Bioenergy:** Introduction, bio-mass conversion technologies, photo synthesis, biogas generation, biogas from power plant wastes, methods of maintaining biogas production, utilization of biogas, biogas gasification

UNIT-IV (9)

**Chemical energy sources:** Introduction to fuel cells, principle of operation of fuel cell, classification of fuel cells, advantages, disadvantages and applications of fuel cells

**Types of energy storage systems:** Introduction, mechanical energy storage systems, batteries, ultra-capacitors, super conducting magnetic storage, applications

**Case study on present scenario of energy generation**

******
Text Book:

Reference Books:

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: evaluate the sources of renewable and conventional energy resources, quantify solar power and judge the applicability of solar energy

CO2: analyze the wind power developed by a wind energy system and the operational difficulties associated with geothermal energy

CO3: analyze the feasibility of harnessing of electric power from oceans and biomass

CO4: select an appropriate energy storage system for a given application and summarize the operating principle of fuel cell

Course Articulation Matrix: U18EE502A RENEWABLE ENERGY SYSTEMS

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### U18EE502B ELECTRICAL ENGINEERING MATERIALS

**Class:** B. Tech. V-Semester  
**Branch:** Electrical & Electronics Engineering

#### Teaching Scheme:

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#### Examination Scheme:

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#### Course Learning Objectives (LOs):

This course will develop students’ knowledge on / in…

- **LO1:** properties of conducting & semiconducting materials and their applications
- **LO2:** classification of insulating & dielectric materials and their application in HV systems
- **LO3:** properties of magnetic materials & nanocomposite materials and their applications
- **LO4:** materials employed for electric and electronic applications

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#### UNIT – I (9)

**Conducting materials:** Introduction, resistivity and factors affecting resistivity, classification of conducting materials into low-resistivity and high resistivity materials, applications of low and high resistivity materials and their alloys, superconducting materials

**Semiconducting materials:** Introduction, energy band theory, intrinsic and extrinsic semiconducting materials, factors affecting electrical conduction in semiconducting materials, photoconductivity, applications of semiconducting materials

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#### UNIT – II (9)

**Insulating materials:** Introduction, general properties, classification, solid insulating materials, insulating liquids, insulating gasses, applications

**Dielectric materials:** Introduction, classification, electrical properties - volume and surface resistivity, dielectric loss, dielectric strength, dielectric constant, polarization, breakdown in dielectric materials, applications of dielectrics in high voltage power equipment

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#### UNIT – III (9)

**Magnetic materials:** Introduction, classification, magnetization curve, hysteresis and eddy current losses, Curie point, magnetostriction, soft and hard magnetic materials, applications

**Nanomaterials:** Origin of nanotechnology, classification, properties and applications of nanomaterials in electrical engineering

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#### UNIT – IV (9)

**Materials for special purposes:** Introduction, structural materials, protective materials, bimetallic strips, soldering materials, electric carbon materials, thermocouple, lighting systems (LCD, LED, CFL)

**Materials for electronic components:** Materials used for resistors, capacitors, inductors, transformers

******

#### Text Book:


#### Reference Books:


*KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme*
Course Learning Outcomes (COs):

On completion of this course, students will be able to...

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U18EE502C COMMUNICATION ENGINEERING

Class: B. Tech. V-Semester
Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):

This course will develop students’ knowledge on/in…

LO1: amplitude modulation techniques and their time domain & frequency domain representations
LO2: angle modulation techniques and their time domain and frequency domain representations
LO3: pulse code modulation techniques
LO4: bandpass data transmission system

UNIT – I (9)

Introduction: Communication system, need for modulation, radio frequency spectrum, classification of modulation techniques

Amplitude Modulation: Time and frequency domain description of amplitude modulation (AM), Generation and demodulation of AM, DSB-SC-generation and demodulation- coherent demodulation - envelop detection - carrier recovery, SSB-SC, VSB and their generation and demodulation, Frequency Division Multiplexing, AM transmitters – High level and low level AM transmitters

UNIT – II (9)


Pulse modulation: Sampling theorem for band limited signals, types of pulse modulation-PAM, PWM, PPM

UNIT – III (9)

Digital Modulation: Introduction, elements of digital communication system, source coding systems-introduction, Discrete Memoryless Source (DMS), measure of information, entropy, information rate, source coding- Shannon Fano, Huffman coding, Shannon Hartley Law

Pulse-Code Modulation (PCM), Quantization, quantization error, signal to quantization noise ratio, Delta modulation (DM), Adaptive Delta Modulation (ADM), comparison of PCM and DM

UNIT – IV (9)

Bandpass Data Transmission: Bandpass data transmission system, generation, detection and constellation diagrams of coherent Binary Amplitude Shift Keying (BASK), Coherent Binary Phase Shift Keying (BPSK), Coherent Binary Frequency Shift Keying (BFSK), Quadrature Phase Shift Keying (QPSK)

******
Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: elaborate different AM modulation and demodulation techniques
CO2: discuss angle modulation and demodulation techniques
CO3: evaluate the codes using Shannon Fano, Huffman and pulse code modulation techniques
CO4: measure the performance of bandpass data transmission systems

Course Articulation Matrix: U18EE502C COMMUNICATION ENGINEERING

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U18EE503 POWER SYSTEMS-II

Class: B. Tech.V-Semester Branch: Electrical & Electronics Engineering
Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):
This course will develop students’ knowledge on /in…

LO1: representation of transmission lines and their performance
LO2: methods of voltage control in transmission lines and per unit representation of power system components
LO3: symmetrical components and power system fault calculations
LO4: travelling waves on transmission lines and system neutral grounding

UNIT – I (9)
Performance of transmission line: Representation of transmission lines, short transmission lines, medium length lines, Nominal T and Π representation, long transmission lines
General network constants (A, B, C, D constants): Cascaded &parallel networks, skin effect, proximity effect and Ferranti effect, surge impedance loading, power flow through transmission lines

UNIT – II (9)
Voltage control: Introduction, methods of voltage control, shunt, series compensation, tap changing transformers, booster transformers, synchronous phase modifiers
Per unit representation of Power systems: Single line diagram, impedance and reactance diagrams, per unit quantities, advantages of per unit systems

UNIT – III (9)
Symmetrical components: Significance of positive, negative, zero sequence components, average 3-phase power in terms of symmetrical components
Symmetrical & Unsymmetrical fault analysis: Sequence impedances and sequence networks for fault calculations, single line to ground (LG) fault, LL fault, LLG fault, LLL fault (without fault impedance), reactors and their location, short circuit capacity of a bus

UNIT – IV (9)
Traveling waves on transmission line: Production of travelling waves, open circuited line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction coefficients at a T-junction, line terminated through a capacitance, attenuators of travelling waves
System neutral grounding: Introduction, ungrounded neutral system, arcing grounds, advantages of neutral grounding, methods of neutral grounding solid grounding, reactance grounding, Peterson coil grounding, grounding transformer, choice of grounding

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Text Book:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to…

CO1: analyze the efficiency & voltage regulation of transmission lines
CO2: evaluate different types of voltage control and compute per unit values in a power system
CO3: determine the fault currents for symmetrical and unsymmetrical faults
CO4: analyze the concept of traveling waves on transmission line and specify types of system neutral grounding

Course Articulation Matrix: U18EE503 POWER SYSTEMS-II

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U18EE504 ELECTRICAL MACHINES - II

Class: B. Tech. V-Semester  
Branch: Electrical & Electronics Engineering

Teaching Scheme:  
Examination Scheme:  
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Course Learning Objectives (LOs):
This course will develop students’ knowledge on/in…

LO1: construction, working principle, equivalent circuit, performance characteristics, starting methods and speed control of 3-phase induction motors
LO2: construction, working principle, equivalent circuit and applications of 1-phase motors
LO3: construction, working principle and performance characteristics 3-phase synchronous generators
LO4: construction, working principle, performance and applications of 3-phase synchronous motors

UNIT – I (9)
3-phase induction motors: Construction details, types, production of rotating magnetic field principle of operation, equivalent circuit, phasor diagram, torque equation, slip torque characteristics, effects & change in supply voltage and frequency on torque and speed, losses and efficiency, determination of equivalent circuit parameters by no load and blocked rotor tests, double cage induction motor, applications
AC starters: Direct online (DOL), Star- Delta (\(\gamma-\Delta\)), Autotransformer, Rotor resistance starters
Methods of speed control: Pole changing, variable frequency variable voltage, rotor resistance, rotor injected emf technique

UNIT – II (9)
1-phase induction motors: Principle & operation, double field revolving theory, methods of starting-split phase, capacitor run, capacitor start and run, shaded pole induction motors, equivalent circuit, determination of equivalent circuit parameters by conducting no-load & blocked rotor tests, applications
Universal motor: Constructional features, working principle, characteristics and applications

UNIT – III (9)
3-phase synchronous generators: Construction, types, winding factors, production of emf, harmonics armature reaction, synchronous reactance, phasor diagrams, load characteristics, OC & SC tests, methods of predetermination of voltage regulation by synchronous impedance (EMF), MMF and Potier (ZPF) methods, two-reaction theory and phasor diagrams for a salient-pole synchronous machine, slip test, power angle characteristics, synchronization & synchronizing power, parallel operation and load sharing, operation on infinite bus bar, applications

UNIT – IV (9)
3-phase synchronous motors: Principle of operation, phasor diagrams, methods of starting of 3-phase synchronous motors, variation of current and power factor with excitation and mechanical load, hunting and its applications, determination of V- & inverted V-curves, excitation circles and power circles, power factor correction using 3-phase synchronous motors, synchronous condenser, applications

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Books:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: determine the performance, evaluate the performance indices and implement speed control of 3-phase induction machines

CO2: determine the equivalent circuit parameters and suggest the starting methods for 1-phase induction motor

CO3: determine the performance and evaluate the performance indices of 3-phase synchronous generators

CO4: describe the operation & performance of 3-phase synchronous motors and apply them for power factor correction

Course Articulation Matrix: U18EE504 ELECTRICAL MACHINES - II

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U18EE506 POWER ELECTRONICS

Class: B. Tech. V-Semester  
Branch: Electrical & Electronics Engineering

Teaching Scheme: 

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Examination Scheme: 

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):

This course will develop students’ knowledge on/in...

LO1: power semiconductor devices and triggering methods & protection of SCR
LO2: operation and performance of controlled rectifiers
LO3: forced commutation techniques of SCR and operation & performance of inverters & choppers
LO4: operation of AC voltage controller & cycloconverter and power electronic applications in industry

UNIT – I (9)

Characteristics of Power Semiconductor Devices: Introduction of power semiconductor devices like power diode, SCR, GTO, MOSFET, IGBT and their characteristics
Qualitative treatment of DIAC, TRAIC, SiC & GaN devices

Silicon Controlled Rectifier (SCR): Two transistor analogy of SCR, gate triggering circuits, resistance, resistance-capacitance trigger circuits, UJT as relaxation oscillator, Protection of SCR against over voltages, over currents, voltage & current transients

UNIT – II (9)

Phase Controlled Rectifiers: Natural commutation, phase angle control - single phase & three phase - half wave, full wave, half controlled and fully controlled rectifiers - with and without freewheeling diodes for R, R-L and R-L-E loads, distortion factor and power factor calculation, effect of source inductance, Dual converters

UNIT – III (9)

Forced commutation Techniques of SCR

Choppers: Basic circuit, Step-up& Step-down, Classification of choppers on the basis of various quadrants, DC-DC converters without electrical isolation: Buck, Boost, Buck-Boost (Continuous Conduction Mode only)

Inverters: Voltage source inverters and Current source inverters, 1-phase and 3-Phase bridge inverters (180°, 120° conduction mode), Brief introduction to sinusoidal pulse width modulation of single-phase & three-phase VSI

UNIT – IV (9)

AC Voltage Controllers: Single Phase AC Controllers with R and RL loads

Single Phase Cycloconverters: Principle and operation of centre tap and bridge type

Applications of Power Electronics Converters: Battery charger, Uninterruptible power supply, Switched mode power supply: forward, flyback and push-pull converters (qualitative treatment only)

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Text Book:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: select power semiconductor switching devices for a given application by understanding their characteristics and snubber circuit in SCR based power converters

CO2: analyze the performance of 1-phase, 3-phase controlled rectifiers and dual converters with R, R-L & R-L-E loads

CO3: implement the commutation circuit in SCR based power converters and analyze voltage & current source inverter circuits and buck, boost, buck-boost DC-DC converters

CO4: describe the operating principle of 1-phase AC voltage controllers, 1-Φ to 1-Φ cycloconverters & applications of power electronics converters

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U18EC511 MICROPROCESSORS AND MICROCONTROLLER SYSTEMS

Class: B. Tech.V-Semester
Teaching Scheme:

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Branch: Electrical & Electronics Engineering
Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):
This course will develop students’ knowledge on /in…

LO1: architecture of 8085 microprocessor
LO2: assembly language programming of 8085 microprocessor
LO3: architectural features of 8086 microprocessor
LO4: architecture of 8051 microcontroller and its interfacing

UNIT–I (9)
8085 Microprocessor: Architecture, Registers, Flags, Pin configuration & function of each pin, timing diagrams-machine cycle fetch, Decode & Execute operations, Memory and I/O read and write cycles WAIT state, interrupt timing diagram

UNIT–II (9)
Instruction Set and Programming: Addressing modes of 8085, instruction set, data transfer, arithmetic, logical, rotate, branch and machine control instructions, simple assembly language programs, time delays, concept of stack & instruction related to stack, 8085 interrupts, RST, RIM, SIM instructions, Subroutines and Conditional call instructions

UNIT – III (9)
8086 Microprocessor: Organization of 8086 CPU, Architecture, general purpose registers, segment registers, concept of memory segmentation, segment registers, physical and logical addressing, addressing modes, pin diagram, minimum & maximum mode of operation, timing diagrams for I/O operations, procedures and macros

UNIT – IV (9)
8051 Microcontroller: Architecture, instruction set, addressing modes, assembly language programming, timers, input-output ports, interrupts, serial ports, interfacing with LEDs, Switches & Stepper Motor, Real Time Clock (RTC)

Text Book:

[1]. Ramesh S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5th ed.,2000, Penram International, Mumbai. (Chapter1,2,3,4,5,6,7,8,9)

[2]. Muhammed Ali Mazidi, The 8051 Microcontrollers and Embedded systems using Assembly and C, 2nd ed., 2006, Pearson, New Delhi. (Chapter 1,2,3,4,5,6,8,9,10,11,12,13)

Reference Books:


KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme

**Course Learning Outcomes (COs):**

On completion of this course, students will be able to...

**CO1:** discuss the architectural features, instruction formats, pin configuration and timing diagrams of 8085 microprocessor

**CO2:** develop assembly language programs using instruction set of 8085 microprocessor for data manipulation, writing subroutines, generation of delays

**CO3:** discuss architecture, memory segmentation & addressing modes of 8086 microprocessor

**CO4:** develop programs for interfacing I/O devices with 8051 microcontroller

| Course Articulation Matrix: U18EC511 MICROPROCESSORS AND MICROCONTROLLER SYSTEMS |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
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| CO2 U18EC511.2                 | 2      | 2      | 1      | 1      | 1      | -      | -      | -      | -      | -      | -      | -      | 1      | 2      | 1      |
| CO3 U18EC511.3                 | 2      | -      | 1      | 1      | 1      | -      | -      | -      | -      | -      | -      | -      | 1      | 2      | -      |
| CO4 U18EC511.4                 | 2      | 2      | -      | -      | 1      | -      | -      | -      | -      | -      | -      | -      | 1      | 2      | 1      |
| U18EC511                       | 2      | 2      | 1      | 1      | 1      | -      | -      | -      | -      | -      | -      | -      | 1      | 2      | 1      |

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EE508 ELECTRICAL MACHINES-II LABORATORY

Class: B. Tech.V-Semester

Teaching Scheme:

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Branch: Electrical & Electronics Engineering

Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):

This laboratory course will develop students’ knowledge in/on

LO1: performance characteristics and speed control of 3-phase induction motor
LO2: voltage regulation of 3-phase synchronous generator
LO3: V- and inverted-V curves of 3-phase synchronous motor
LO4: equivalent circuit of 1-phase induction motor

LIST OF EXPERIMENTS

1. Determination of equivalent circuit parameters of a 3-phase induction motor by No-load and Blocked rotor tests
2. Brake test on 3-phase induction motor
3. Speed control of 3-phase induction motor by pole changing method
4. Speed control of 3-phase induction motor by rotor resistance control method
5. Predetermination of regulation of 3-phase synchronous generator by E.M.F method
6. Predetermination of regulation of 3-phase synchronous generator by M.M.F method
7. Determination regulation of 3-phase synchronous generator by Z.P.F. method
8. Determination regulation on 3-phase synchronous generator by direct loading
9. Determination of $X_d$ and $X_q$ of a Salient Pole 3-phase synchronous machine from slip test
10. Determination of V and inverted V curves of 3-phase synchronous Motors
11. Determination of equivalent circuit parameters of 1-phase induction motor
12. Load test on capacitor start and run 1-phase induction motor

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Laboratory Manual:

[1]. Electrical Machines- II Laboratory Manual, Department of EEE, KITSW

Reference Book:

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: predetermine/determine the performance of 3-phase induction motor and implement methods for speed control
CO2: predetermine/determine the voltage regulation of 3-phase synchronous generator using EMF, MMF, ZPF & direct loading methods
CO3: determine the performance of 3-phase synchronous motor using V- & inverted-V curves
CO4: determine the performance of 1-phase induction motor

Course Articulation Matrix: U18EE508 ELECTRICAL MACHINES-II LABORATORY

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U18EE509 POWER ELECTRONICS LABORATORY

Class: B. Tech. V-Semester  Branch: Electrical & Electronics Engineering
Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):

This laboratory course will develop student’s knowledge in/on

LO1: characteristics of power electronics devices, gate firing circuits & commutation circuits for thyristor
LO2: control of 1-Φ semi and fully controlled bridge rectifiers & dual converters
LO3: control of choppers, AC voltage controller, cycloconverter & inverters
LO4: simulation of power electronics circuits using MATLAB

LIST OF EXPERMENTS

1. Characteristics of SCR, IGBT & MOSFET
2. Gate firing circuits for SCR
3. Forced commutation circuits (Class A, Class B, Class C & Class D)
6. Single Phase dual converter with R load
7. Four quadrant chopper
8. Single phase AC voltage controller
9. Single phase Cycloconverter
10. Single Phase Bridge inverter
11. Simulation of single-phase full wave rectifier with R and RL load using MATLAB
12. Simulation of single-phase AC voltage controller with R and RL load using MATLAB
13. Simulation of Sinusoidal Pulse Width Modulated inverter using MATLAB
14. Simulation of DC-DC converter using MATLAB (buck, boost, buck-boost, full-bridge)

Laboratory Manual:

[1]. Power Electronics Laboratory Manual, Department of EEE, KITSW

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: verify the characteristics of power semiconductor devices and output waveforms of firing & commutation circuits for SCRs

CO2: validate the average output voltage and draw the output waveforms of 1-phase semi and fully controlled bridge rectifiers & dual converters for different firing angles

CO3: validate the output waveforms of AC voltage controller, cycloconverter, inverter and chopper

CO4: simulate power electronic circuits and plot their output waveforms using MATLAB

Course Articulation Matrix: U18EE509 POWER ELECTRONICS LABORATORY

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Course Learning Objectives (LOs):

This laboratory course will develop student’s knowledge in/on

LO1: assembly language programming on arithmetic, sorting, string & code conversion operations using 8085 microprocessor
LO2: interfacing I/O devices using 8085 microprocessor
LO3: assembly language programming on arithmetic & sorting using 8051 microcontroller
LO4: interfacing I/O devices using 8051 microcontroller

LIST OF EXPERIMENTS

I. Assembly Language Programming on 8085 Microprocessor using Hardware kit/Software:

1. Assembly Language Program (ALP) for 8-bit
   i. Addition
   ii. Subtraction
   iii. Multiplication
   iv. Division

2. ALP for
   i. Finding the sum of n -8 bit
   ii. Finding the average of n-8 bit numbers
   iii. Finding the sum of n-multi byte numbers
   iv. Finding the largest/smallest number in an array
   v. Arranging numbers in ascending/descending order

3. ALP for
   i. Comparing two strings of bytes
   ii. Finding the number of 1’s in the given string

4. ALP to convert
   i. Binary data to BCD
   ii. BCD to binary data
   iii. Binary data to ASCII data

5. ALP to interface ADC/DAC to 8085 microprocessor
6. ALP to interface LED to 8085 microprocessor
7. ALP to interface stepper motor to 8085 microprocessor

II. Assembly Language Programming on 8051 Microcontroller using Hardware kit/Software:

1. Assembly Language Program (ALP) for arithmetic operations:
   i. Addition
   ii. Subtraction
3. ALP for
   i. Finding the smallest/largest number in an array of numbers
   ii. Arranging an array of numbers in ascending/descending order
3. ALP to interface stepper motor to 8051 microcontroller
4. ALP to interface seven segment LED display to 8051 microcontroller

Laboratory Manual:
1. Microprocessors & Microcontroller Laboratory Manual, Department of ECE, KITSW.

Reference Books:
1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085”, Penram International.

Course Learning Outcomes (COs):
On completion of this course, students will be able to...

CO1: develop assembly language programs on arithmetic sorting, string & code conversion operations using 8085 microprocessor
CO2: develop assembly language programs for interfacing 8085 microprocessor with I/O devices
CO3: develop assembly language programs on arithmetic & sorting operations using 8051 microcontroller
CO4: develop assembly language programs for interfacing 8051 microcontroller with I/O devices

Course Articulation Matrix: U18EC512 MICROPROCESSORS AND MICROCONTROLLER SYSTEMS LABORATORY

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EE510 SEMINAR

Class: B. Tech.V-Semester

Teaching Scheme:

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Branch: Electrical & Electronics Engineering

Examination Scheme:

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Course Learning Objectives (LOs):

This course will develop student’s knowledge in/on

LO1: selecting topic, referring to peer reviewed journals / technical magazines / conference proceedings

LO2: literature review and well-documented report writing

LO3: creating PPTs and effective technical presentation

LO4: preparing a technical paper in scientific journal style & format

Student has to give independent seminar on the state-of-the-art technical topics relevant to their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a Department Seminar Evaluation Committee (DSEC)
2. DSEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective seminar presentation
3. There shall be only Continuous Internal Evaluation (CIE) for seminar
4. The CIE for seminar is as follows:

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<td>Seminar Report</td>
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<td>Seminar Paper</td>
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<td>DSEC Assessment: Oral presentation with PPT and viva-voce</td>
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<td><strong>Total Weightage:</strong></td>
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Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Seminar Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest.

(b) **Report**: Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by DSEC.

(c) **Anti-Plagiarism Check**: The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.

(d) **Presentation**: Each student should prepare PPT with informative slides and make an effective oral presentation before the DSEC as per the schedule notified by the department.

(e) The student has to register for the Seminar as supplementary examination in the following cases:
   i) he/she is absent for oral presentation and viva-voce
ii) he/she fails to submit the report in prescribed format
iii) he/she fails to fulfill the requirements of seminar evaluation as per specified guidelines.

(f) i) The CoE shall send a list of students registered for supplementary to the HoD concerned
ii) The DSEC, duly constituted by the HoD, shall conduct seminar evaluation and send the award list to the CoE within the stipulated time

********

**Course Learning Outcomes (COs):**

On completion of this course, student will be able to…

CO1: select current topics in their engineering discipline & allied areas from peer reviewed journals / technical magazines/ conference proceedings

CO2: demonstrate the skills for performing literature survey, identify gaps, analyze the technical content and prepare a well-documented seminar report

CO3: create informative PPT and demonstrate communication skills through effective oral presentation showing knowledge on the subject & sensitivity towards social impact of the seminar topic

CO4: write a “seminar paper” in scientific journal style & format from the prepared seminar report

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**Course Articulation Matrix: U18EE510 SEMINAR**

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VI-SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

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Total: 20 1 6 23 250 210 460 540 100

Additional Learning*: Maximum credits allowed for Honours/Minor

Total credits for Honours/Minor students: 23+7

Total Contact Hours/C: 23

* List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/Minor Curricula Note: L - Lectures; T - Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment; MSE - Mid Semester Examination; ESE - End Semester Examination;

Professional Elective-II / MOOC - II
U18EE 603A: Utilization of Electrical Energy
U18EE 603B: High Voltage Engineering
U18EE 603C: Electric Vehicles
U18EE 603M: MOOCsCourse

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18TP501/U18TP601 QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B. Tech.V-Semester
B. Tech.VI-Semester

Branch: ME, CSE, IT, CSN
CE, EIE, EEE, ECE, ECI

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):
This course will develop students’ knowledge on /in...
LO1: quantitative aptitude & problem-solving skills
LO2: computing abstract quantitative information
LO3: application of basic mathematics skills & critical thinking to draw conclusions
LO4: evaluating the validity & possible biases in arguments presented in authentic contexts

UNIT - I (6)
Quantitative Aptitude-I: Number system, Averages, Percentages, Ratios & proportions, Time, Speed & distance, Time and work, Data interpretation

UNIT - II (6)
Quantitative Aptitude-II: Simple Interest, Compound Interest, Profit & Loss, Ages, Permutations & Combinations, Probability

UNIT - III (6)
Logical Reasoning-I: Series completion, Analogy, Coding and decoding, Blood relations, Number, Ranking & Time sequence test, Linear & Circular arrangements

UNIT - IV (6)
Logical Reasoning-II: Data sufficiency, Logical Venn diagram, Syllogisms, Statement & arguments, Statement & Assumptions, Direction sense test

Text Books:


Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to…

CO1: solve arithmetic relationships and interpret data using mathematical models
CO2: compute abstract quantitative information
CO3: apply basic mathematics & critical thinking skills to draw conclusions and solve problems
CO4: evaluate the validity & possible biases in arguments presented in authentic contexts logically & sensibly

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## Course Learning Objectives (LOs):

This course will develop students' knowledge on:

- **LO1:** basic concepts of management
- **LO2:** concepts of economics and forms of business organizations
- **LO3:** fundamentals of accounting and journalising
- **LO4:** preparation of final accounts

## UNIT-I (9)

**Management:** Meaning and definition, Scientific Management - Definition, Characteristics, Principles of management

**Functions of Management:** Planning - Definition, Characteristics; Organizing - Definition, Characteristics; Staffing - Meaning, Functions of personnel management; Directing - Leadership, Nature; Motivation – Nature, Types (financial, non-financial, intrinsic and extrinsic), Communication- Process, Types, Co-ordination- Definition, Steps to achieve effective coordination, Controlling- Definition, process

## UNIT-II (9)

**Economics:** Meaning and definition, Scope, Micro and Macro Economics, Methods of Economics, Laws of Economics

**Forms of Business Organization:** Sole Proprietorship, Partnership firm - Types of Partners, Cooperative society, Joint stock company - Features, Types, Merits and demerits

## UNIT-III (9)

**Double Entry System and Book Keeping:** Accounting concepts and conventions, Overview of accounting cycle, Journal-meaning, Journalizing, Ledger - Meaning, Ledger posting, Balancing; Cash book (Single column), Preparation of Trial balance

## UNIT - IV (9)

**Final Accounts:** Trading Account, profit and loss account and Balance Sheet with simple adjustments

**Text Books:**


**Reference Books:**

Course Learning Outcomes (COs):
On completion of this course, students will be able to…

CO1: comprehend the basic concepts of management
CO2: distinguish between micro & macro economics & forms of business organizations
CO3: pass journal entries & post them into ledgers
CO4: prepare profit & loss accounts and assess the financial position through the balance sheet

| Course Articulation Matrix: U18MH602/U18MH701 MANAGEMENT ECONOMICS AND ACCOUNTANCY |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| CO1 U18MH602/  |
| U18MH701.1     | -               | -               | -               | -               | -               | -               | 1               | 1               | 1               | 1               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               |
| CO2 U18MH602/  |
| U18MH701.2     | -               | -               | -               | -               | -               | -               | -               | 1               | 1               | 2               | 1               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               |
| CO3 U18MH602/  |
| U18MH701.3     | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | 1               | 1               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               |
| CO4 U18MH602/  |
| U18MH701.4     | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | 1               | 1               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               |
| U18MH602/     |
| U18MH 701      | -               | -               | -               | -               | -               | -               | 1               | 1               | 1.25            | 1               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               | -               |
U18EE603A UTILIZATION OF ELECTRICAL ENERGY

Class: B. Tech.VI-Semester

Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):

This course will develop student’s knowledge in/on …

LO1: electric traction systems and speed control of DC and AC traction motors

LO2: selection of motor for industrial applications

LO3: electric heating and welding techniques

LO4: illumination, lamps, lighting schemes and power factor correction

UNIT-I (9)

**Electric Traction:** Systems of electric traction, transmission of drive, mechanics of traction movement, trapezoidal and quadrilateral speed – time curves, tractive effort, power and energy output from driving axles, specific energy output, specific energy consumption, factors effecting the specific energy consumption and coefficient of adhesion, concept of average speed and schedule speed, Speed control methods of DC traction motors-rheostatic, field control, series-parallel method, Speed control methods of AC traction motors, shunt-bridge transition, Collection of current - third rail, overhead wires, pantograph

UNIT-II (9)

**Industrial Drives:** Introduction, factors governing selection of electric motors, nature of electric supply, types of drives, nature of loads, standard ratings of motors, choice of ratings of motors, types of motors used in industrial drives, cement manufacturing industries, textile mills, paper mills, ship propulsion drives

UNIT-III (9)

**Electric Heating:** Elementary principle of heat transfer, Stefan’s law, types of electric furnaces, resistance furnace, design of heating element, losses and efficiency, construction and working of different types of induction furnaces – dielectric heating, arc furnaces

**Electric Welding:** Types of welding, resistance, gas and arc welding, characteristics of carbon and metal arc welding, comparison

UNIT-IV (9)

**Illumination**(qualitative treatment only): Terminology, Laws of illumination, coefficient of utilisation and depreciation, polar curves, sources of light- fluorescent lamps, compact fluorescent lamps, LED lamps, discharge lamps, mercury vapour lamps, sodium vapour lamps and neon lamps, comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, types and design of lighting scheme, lighting calculations for a given surface, Factory lighting, street lighting and flood lighting

**Power Factor Correction:** Introduction, disadvantages of a low power factor, causes of low power
factor, power factor improvement, economics of power factor improvement, most economical power factor when kW demand is constant, most economical power factor when kVA demand is constant

*****

Text Book:


Reference Books:


Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: compute tractive effort, specific energy consumption for different speed-time curves

CO2: identify suitable motors for industrial applications

CO3: design circular and ribbon type heating element and describe the welding techniques

CO4: design lighting scheme for a given surface and determine the capacitance for power factor improvement

**Course Articulation Matrix: U18EE603A UTILIZATION OF ELECTRICAL ENERGY**

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U18EE603B HIGH VOLTAGE ENGINEERING

Class: B. Tech.VI-Semester Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Examination Scheme:

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<td>End Semester Examination</td>
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Course Learning Objectives (LOs):
This course will develop student’s knowledge in/on …

LO1: breakdown mechanisms in solid, liquid and gaseous dielectrics
LO2: methods and circuits to generate high DC, AC, impulse voltages and currents
LO3: techniques employed in high voltage and current measurements
LO4: causes of over voltages and impulse and power frequency tests on the power system components

UNIT – I (9)

Breakdown Mechanism of Gases: Townsend’s first ionization coefficient, cathode processor, secondary effects, Townsend’s second ionization coefficient, Townsend’s breakdown mechanism, experimental determination of coefficients and breakdown in electronegative gases, steamer or Kanal mechanism of breakdown, Paschen’s Law, Penning effect, breakdown in non-uniform fields and corona discharges, time – lag, practical considerations in using gases for insulation purposes, vacuum insulation

Breakdown Mechanism of Solids and Liquids: Introduction, intrinsic breakdown, electro mechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, chemical and electro chemical deterioration and breakdown, breakdown due to treeing and tracking, breakdown due to internal discharges, breakdown in composite dielectrics, liquids as insulators, pure liquids and commercial liquids, conduction and breakdown in commercial liquids – suspended particle theory, cavitation and the bubble theory, thermal mechanism of breakdown, stressed volume theory

UNIT – II (9)

Generation of High DC & AC Voltages and Currents: Half wave rectifier circuit, voltage doubler circuits, Cockcroft-Walton voltage multiplier circuit, electrostatic generator, Vande Graaff generator, generation of high AC voltages, cascaded transformers, resonant transformer, generation of high frequency AC High voltages, generation of rectangular current pulses, tripping control of impulse generator

Generation of High Impulse Voltages and Currents: Definition of impulse currents & voltages, impulse voltage generator circuits, Marx’s multistage voltage generator, tripping control of impulse voltage generator, generation of switching surges, definition of impulse current wave forms, impulse current generator

UNIT – III (9)

Measurement of High Voltage DC, AC and Impulse Voltages: High ohm series resistance, resistance potential divider, R-C capacitive voltage divider, generating voltmeter series capacitance voltmeter, CVT, electrostatic voltmeters, peak reading AC voltmeters (Chubb–Fortescue method), spherical measurements (spherical gaps) for high DC and AC voltages, impulse voltages
Measurement of High Currents: Hall generators for DC current measurements, resistive shunts, bipolar strip shunt, coaxial tubular shunt, squirrel cage shunts

Cathode Ray Oscillographs for Impulse Measurements

UNIT – IV (9)

Overvoltage Phenomenon: Lightning phenomenon, overvoltages due to switching surges, system faults and other abnormal conditions, principle of insulation co-ordination on HV and EHV power systems

High Voltage Testing Techniques: Power frequency and impulse testing of insulators, bushings, cables, transformers, surge diverters, isolators and circuit breakers

Text Book:

Reference books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: identify the breakdown mechanisms in solid, liquid or gaseous dielectric media
CO2: apply the principles of machines and electronic circuits to generate high AC, DC, impulse voltages & currents
CO3: apply the principles of electrical measurements for measuring high voltages & currents
CO4: identify the causes of overvoltages in power systems and describe the power frequency & impulse tests conducted on power system components

Course Articulation Matrix: U18EE603B HIGH VOLTAGE ENGINEERING

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KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
U18EE603C  ELECTRIC VEHICLES

Class:  B. Tech. VI-Semester
Branch:  Electrical & Electronics Engineering
Teaching Scheme:

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Examination Scheme:

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<td>End Semester Examination</td>
<td>60 marks</td>
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Course Learning Objectives (LOs):
This course will develop student’s knowledge in/on …
LO1: electric vehicles and types of batteries
LO2: electric machines and controllers used in electric vehicles
LO3: modeling of scooter, small electric car and battery electric vehicle
LO4: charging and modeling of batteries

UNIT-I (9)

Introduction to Electric Vehicles (EVs): Brief History of EVs, Electric vehicles and the environment: Vehicle pollution, Developments towards the end of the 20th century, types of electric and hybrid electric vehicles in use today, electric vehicles for the future

Batteries: Introduction, Battery parameters, Types - Lead acid batteries, Nickel-based batteries, Sodium-based batteries, Lithium batteries, Metal air batteries, Use of batteries in electric and hybrid vehicles

UNIT-II (9)

Electric Machines and Controllers for EVs: Brushed DC electric motor, DC regulation: buck and boost regulators and voltage conversion: single phase and three phase inverters

Brushless Electric Motors: Brushless DC motor, switched reluctance motors, induction motor, motor cooling, efficiency, size and mass, electrical machines for hybrid vehicles

UNIT-III (9)

Electric Vehicle Modelling: Tractive effort-rolling resistance force, aerodynamic drag, hill climbing force, acceleration force, total tractive effort; Modelling vehicle acceleration: acceleration performance parameters, modelling the acceleration of an electric scooter, modelling the acceleration of a small car, Modelling electric vehicle range: driving cycles, range modelling of battery electric vehicles, constant velocity range modelling

UNIT-IV (9)

Battery Charging: Battery chargers, charge equalization, designer’s choice of battery

Battery Modelling: The purpose of battery modelling, battery equivalent circuit, modelling battery capacity, simulation of a battery at a set power, calculating the Peukert coefficient, approximate battery sizing

Text Books:

***/
Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

**CO1**: classify electric vehicles and describe various batteries

**CO2**: identify motors and controllers used in electric vehicles

**CO3**: model electric scooter, small electric car and battery electric vehicle

**CO4**: take part in design and simulation of the batteries used in electric vehicles

Course Articulation Matrix: U18EE603C Electric Vehicles

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U18EE604 POWER SYSTEM OPERATION AND CONTROL

Class: B. Tech.VI-Semester  
Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Course Learning Objectives (LOs):
This course will develop student’s knowledge in/on …

LO1: computation of load flows in a power system
LO2: economic load scheduling and unit commitment
LO3: load frequency control in an isolated and two-area power system
LO4: stability, stability limits and the dynamics of synchronous machines

UNIT – I (9)

Load flow studies: Introduction, Bus classification, Nodal admittance matrix, load flow equations, iterative methods – Gauss, Gauss-Seidel and Newton-Raphson methods, Newton decoupled and fast decoupled, merits and demerits of these methods

UNIT – II (9)

Economic Operation of Power Systems: Distribution of load between units within a plant, transmission loss as a function of plant generation, calculation of loss coefficients, distribution of load between plants
Unit commitment: introduction, constraints in unit commitment problems

UNIT – III (9)

Load Frequency control: Introduction, load frequency problem, megawatt frequency (or P-F) control channel, MVAr voltage (or Q - V) control channel, dynamic interaction between P-F and Q-V loops, mathematical model of speed governing system, turbine models division of power system into control areas, P-F control of single control area (uncontrolled and PI controlled cases) P-F control of two area systems (uncontrolled and PI controlled cases)

UNIT – IV (9)


Text Book:

Reference Books:

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme

**Course Learning Outcomes (COs):**

On completion of this course, the students will be able to…

<table>
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<tr>
<th>CO</th>
<th>CO1: compute the state variables &amp; the power flows in a power system using Gauss-Seidel &amp; Newton-Raphson methods</th>
<th>CO2: determine the optimal economic load scheduling for a given power demand</th>
<th>CO3: describe the frequency response of a single area &amp; two area system with and without PI controllers</th>
<th>CO4: analyse the stability of power systems and determine the critical clearing angle &amp; critical clearing time</th>
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**Course Articulation Matrix: U18EE604 POWER SYSTEM OPERATION AND CONTROL**

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U18EE605 POWER SEMICONDUCTOR DRIVES

Class: B. Tech.VI-Semester
Teaching Scheme:

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Branch: Electrical & Electronics Engineering
Examination Scheme:

Course Learning Objectives (LOs):
This course will develop student’s knowledge in/on …
LO1: fundamentals and dynamics of electric drives
LO2: rectifier control and chopper control of DC drives
LO3: AC voltage control, frequency control and slip power recovery control of induction motor drives
LO4: synchronous motor drives and its speed-torque characteristics

UNIT-I (9)
Fundamentals of Electric Drives: Electric drives, advantages of electric drives, parts of electric drives, choice of electric drives, status of DC drives and AC drives, Starting, braking, speed control of motors, Dynamics of electric drives: fundamental torque equations, types of load, quadrant diagram of speed-torque characteristics, dynamics of load torque combinality, steady state stability and transient stability of an electric drives, load equalization, calculation of time and energy loss in transient operation, drive specifications

UNIT-II (9)
Rectifier Control of DC drives: Controlled rectifier circuits, braking operation of rectifier controlled separately excited DC motor, single phase and three phase half and fully controlled rectifier fed separately excited DC motor, multi quadrant operation of fully controlled rectifier fed separately excited DC motor
Chopper control of DC drives: chopper control of separately excited and series DC motors, multi quadrant control of chopper fed motors

UNIT-III (9)
Control of Induction Motor Drives: Braking and speed control of induction motor
AC Voltage Controllers: control of induction motor by AC voltage controllers
Frequency-controlled Induction Motor Drives: control of induction motor by Voltage Source Inverter (VSI), Current Source Inverter (CSI), Current controlled PWM inverters
Slip Power-controlled Wound-Rotor Induction Motor Drives: static rotor resistance control, constant torque and constant power drives (static Scherbius & Kramer drives)

UNIT-IV (9)
Control of Synchronous Motor Drives: Braking and speed control of synchronous motor, Operation of cylindrical rotor synchronous motor from VSI and CSI, self-controlled synchronous motor drives using cycloconverters, permanent magnet AC motor drives

******
Text Book:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, students will be able to…

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<td>CO2: design control schemes for rectifier &amp; chopper-controlled DC drives</td>
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<td>CO3: design control schemes for squirrel cage and wound rotor induction motor drives</td>
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<td>CO4: distinguish the operation of self-controlled &amp; true controlled synchronous motor drive</td>
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Course Articulation Matrix: U18EE605 POWER SEMICONDUCTOR DRIVES

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U18EE606 CONTROL SYSTEMS ENGINEERING

Class: B. Tech.VI-Semester  
Branch: Electrical & Electronics Engineering

Teaching Scheme:

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Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination | 60 marks |

Course Learning Objectives (LOs):
This course will develop student’s knowledge in/on …

LO1: transfer function representation of physical systems
LO2: assessing the system performance using time domain analysis and methods for improving it
LO3: assessing the system’s stability and performance using frequency domain analysis
LO4: state space modeling of physical systems and the compensation techniques

UNIT-I (9+3)

Concepts of Control systems: Introduction, classification of control systems, open loop and closed loop control systems, effects of feedback, mathematical modeling - linear differential equations-translational and rotational mechanical systems, analogous systems, electro-mechanical systems, electrical systems

Block diagram reduction technique, signal flow graph method, Mason’s Gain formula

UNIT-II (9+3)

Control System Components: AC & DC Servomotors, Synchros


UNIT-III (9+3)

Stability Analysis: Introduction, Routh-Hurwitz stability criteria – qualitative stability and conditional stability, root locus technique - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci

Frequency Response Analysis: Introduction, frequency domain specifications -correlation between frequency and time domain specifications- bode plots- transfer function from the bode plot- phase margin and gain margin-stability analysis from Bode plots, stability analysis through polar plots, Nyquist stability criteria, determining the response of systems using MATLAB

UNIT-IV (9+3)

Control System Analysis using State Variable Method: Introduction- state variable representation-conversion of state models to transfer functions- conversion of transfer functions to state models-deriving state models from physical systems, state transition matrix, solution of state equations-concepts of controllability and observability

Compensation: Introduction, elementary treatment of lead, lag and lead-lag compensation

*****
Text Book:

Reference Books:

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: develop transfer function models for dynamic systems
CO2: evaluate time domain specifications of first & second order systems and compare the performance of different controllers
CO3: analyze stability of systems in time & frequency domains
CO4: develop state space model of a given physical system and understand the basic concepts of compensating techniques

Course Articulation Matrix: U18EE606 CONTROL SYSTEMS ENGINEERING

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U18E1614 SIGNALS AND LINEAR SYSTEMS

Class: B. Tech.VI-Semester

Teaching Scheme:

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Branch: Electrical & Electronics Engineering

Examination Scheme:

| Continuous Internal Evaluation | 40 marks |
| End Semester Examination       | 60 marks |

Course Learning Objectives (LOs):

This course will develop student’s knowledge in/on ...

LO1: continuous-time (CT), discrete-Time (DT) signals, systems and convolution
LO2: continuous-time Fourier transforms (CTFT) and discrete-time Fourier series
LO3: discrete-time Fourier series (DTFS) and discrete-time Fourier transform (DTFT) and its applications
LO4: $z$-Transform, stability of LTI systems and realizations of IIR systems

UNIT - I (9)

Signals and Systems: Continuous-time (CT) and discrete-time (DT) signals, sampling theorem (statement only), exponential and sinusoidal signals, singularity functions, CT & DT systems, basic system properties

Linear Time–Invariant (LTI) Systems: DT-LTI systems, convolution sum, CT-LTI systems, convolution integral, properties of LTI systems, LTI systems described by differential and difference equations, FIR and IIR systems

UNIT - II (9)

Continuous-Time Fourier Transform (CTFT): CTFT for representation of aperiodic signals, CTFT for periodic signals, properties of the CTFT, convolution property, multiplication property, systems characterized by linear constant–coefficient differential equations (LCCDE)

UNIT - III (9)

Discrete-Time Fourier Transform (DTFT): DTFT for aperiodic signals, DTFT for periodic signal, properties for the DTFT, convolution property, multiplication property, systems characterized by linear constant-coefficient difference equations (LCCDE)

UNIT - IV (9)

$z$-Transform: $z$-transform, region of convergence (ROC), properties of $z$-transform, $z$-transform of some common signals, Inverse $z$-transform: power series method, partial fractions method and Cauchy’s integral method, Analysis and characterization of LTI system using $z$-transform

Text Book:


Reference Books:


**Course Learning Outcomes (COs):**

On completion of this course, students will be able to...

- **CO1**: classify CT / DT Signals & Systems and find the response of an LTI system to any arbitrary signal using convolution
- **CO2**: evaluate CTFT of standard signals and use properties of CTFT for solving LCCDE
- **CO3**: compute DTFT of standard signals and derive properties of DTFT and use them for solving LCCDE
- **CO4**: determine the z-transform of standard DT signals with ROC, use properties of z-transform to solve difference equations, evaluate stability of an LTI system and realize the DT systems in direct, cascade & parallel forms

**Course Articulation Matrix: U18EI614 SIGNALS AND LINEAR SYSTEMS**

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U18EE607 CONTROL SYSTEMS ENGINEERING LABORATORY

Class: B. Tech.VI-Semester Branch: Electrical & Electronics Engineering
Teaching Scheme:

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Course Learning Objectives (LOs):
This laboratory course will develop student’s knowledge in/on …
LO1: time response of second order system, synchros
LO2: lag-lead compensators, armature-controlled DC motor and AC servomotor
LO3: stability analysis of LTI systems using MATLAB
LO4: controllability, observability and analysis of LTI systems using MATLAB

LIST OF EXPERIMENTS

1. Determination of time domain specifications of uncontrolled second order system.
2. Study performance of P, PI, PID controllers for a second order system
3. Study of characteristics of Synchro Transmitter-Receiver pair
4. Analysis of Lag and lead compensation with reference to Magnitude and phase plot
5. Determination of transfer function for armature-controlled DC motor
6. Study of Characteristics of AC servomotor
7. Stability analysis through Root Locus plot of L.T.I. system using MATLAB
8. Stability analysis through Bode plot of L.T.I. system using MATLAB
10. Stability analysis through Nyquist criteria using MATLAB
11. Verification of Controllability & Observability of L.T.I system using MATLAB
12. Linear system analysis (Time domain analysis, Error analysis) using MATLAB

Laboratory Manual:
[1]. Control Systems Laboratory Manual, Department of EEE, KITSW

Reference Books:

KITSW-Syllabi for III to VI Semester B.Tech. EEE 4-year Degree Programme
Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: determine time response specifications of uncontrolled & controlled second order system and plot the characteristics of synchros

CO2: plot the characteristics of lag-lead compensators, armature-controlled DC motor & AC servomotor

CO3: analyze the stability of LTI systems using MATLAB

CO4: determine controllability & observability of a given LTI system using MATLAB

Course Articulation Matrix: U18EE607 CONTROL SYSTEMS ENGINEERING LABORATORY

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**U18EE608 POWER SEMICONDUCTOR DRIVES LABORATORY**

**Class:** B. Tech.VI-Semester  
**Branch:** Electrical & Electronics Engineering

**Teaching Scheme:**

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**Examination Scheme:**

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**Course Learning Objectives (LOs):**

This laboratory course will develop student’s knowledge in/on …

- **LO1:** single phase and three phase converter-controlled drives
- **LO2:** single phase VSI, AC voltage controlled and cycloconverter controlled drive
- **LO3:** chopper controlled DC drive and control of induction drive
- **LO4:** simulation of drives using MATLAB-Simulink

**LIST OF EXPERIMENTS**

1. Single phase fully converter controlled drive
2. Single phase semi converter controlled drive
3. Three phase fully/semi converter controlled drive
4. Single phase VSI-PWM control drive
5. Single phase AC voltage converter controlled drive
6. Single phase Cyclo-converter controlled drive
7. Four quadrant chopper fed DC drive
8. Buck Converter controlled DC drive
9. Rotor resistance control of wound rotor induction drive
10. Closed loop control of three phase induction drive
11. Simulation of single-phase fully controlled converter DC drive using MATLAB-Simulink
12. Simulation of VSI controlled induction motor drive using MATLAB-Simulink

******

**Laboratory Manual:**

[1]. *Power Semiconductor Drives Laboratory Manual*, Department of EEE, KITSW.

**Reference book:**

Course Learning Outcomes (COs):

On completion of this course, students will be able to...

CO1: determine the voltage and speed of single phase and three phase converter-controlled DC drives for different firing angles

CO2: determine the voltage and speed of AC drives controlled by VSI, AC voltage controller & cycloconverter

CO3: determine the voltage and speed of chopper-controlled DC drive for different duty cycles & speed characteristics of induction drives for varying loads.

CO4: simulate AC & DC drives using MATLAB-Simulink and draw the corresponding characteristics

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U18EE610 MINIPROJECT

Class: B. Tech.VI-Semester  Branch: Electrical & Electronics Engineering

Teaching Scheme: Examination Scheme:

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<th>L</th>
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<th>Continuous Internal Evaluation 100 marks</th>
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<td>End Semester Examination -</td>
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Course Learning Objectives (LOs):

This course will develop students’ knowledge in/on….

LO1: implementing a project independently by applying knowledge to practice

LO2: literature review and well-documented report writing

LO3: creating PPTs and effective technical presentation skills

LO4: writing technical paper in scientific journal style & format and creating video pitch

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a Department Mini Project Evaluation Committee (DMPEC)

2. DMPEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation

3. There shall be only continuous Internal Evaluation (CIE) for miniproject

4. The CIE for mini project is as follows:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weightage</th>
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<tbody>
<tr>
<td>Mini Project Supervisor Assessment</td>
<td>20%</td>
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<tr>
<td>Working model / process / software package / system developed</td>
<td>20%</td>
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<tr>
<td>Mini Project report</td>
<td>20%</td>
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<tr>
<td>Mini Project paper</td>
<td>10%</td>
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<tr>
<td>Video pitch</td>
<td>10%</td>
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<tr>
<td>DMPEC Assessment: Oral presentation with PPT and viva-voce</td>
<td>20%</td>
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<tr>
<td><strong>Total Weightage:</strong></td>
<td><strong>100%</strong></td>
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Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(g) Mini Project Topic: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(h) Working Model: Each student is requested to develop a working model / process / system on the chosen work and demonstrate before the DMPEC as per the dates specified by DMPEC
(i) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by DMPEC.

(j) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.

(k) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the DMPEC as per the schedule notified by the department.

(l) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (if any) and social impact.

(m) The student has to register for the Mini project as supplementary examination in the following cases:

   iv) he/she is absent for oral presentation and viva-voce
   v) he/she fails to submit the report in prescribed format
   vi) he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines

(n) i) The CoE shall send a list of students registered for supplementary to the HoD concerned

   ii) The DSEC, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time

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**Course Learning Outcomes (COs):**

On completion of this course, students will be able to...

CO1: apply knowledge to practice to design & conduct experiments and utilize modern tools for developing working models / process / system leading to innovation & entrepreneurship

CO2: demonstrate the competencies to perform literature survey, identify gaps, analyze the problem and prepare a well-documented Mini project report

CO3: make an effective oral presentation through informative PPTs, showing knowledge on the subject & sensitivity towards social impact of the Mini project

CO4: write a “Mini project paper” in scientific journal style & format from the prepared Mini project report and create a video pitch on Mini project

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**Course Articulation Matrix: U18EE610 MINI PROJECT**

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