VEER BAHADUR SINGH PURVANCHAL UNIVERSITY JAUNPUR, UTTAR PRADESH

EVALUATION SCHEME & SYLLABUS FOR

B. TECH. 2nd YEAR ELECTRICAL ENGINEERING

BASED ON

AICTE MODEL CURRICULUM

[Effective from the Session: 2020-21]

EVALUATION SCHEME - B.TECH 2nd YEAR (ELECTRICAL ENGINEERING)

SEMESTER- III													
Sl. No.	**Subject Codes**	**Subject**	**Periods**			**Evaluation Scheme**				**End Semester**		**Total**	**Credit**
			L	**T**	**P**	**CT**	**TA**	**Total**	**PS**	**TE**	**PE**		
1	KOE031-38/ KAS302	Engg. Science Course/Maths IV	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE301	Technical Communication/Universal Human values	2 3	1 0	0 0	30	20	50		100		150	3
3	KEE301	Electromagnetic Field Theory	3	1	0	30	20	50		100		150	4
4	KEE302	Electrical Measurements & Instrumentation	3	1	0	30	20	50		100		150	4
5	KEE303	Basic Signals & Systems	3	0	0	30	20	50		100		150	3
6	KEE351	Analog Electronics Lab	0	0	2				25		25	50	1
7	KEE352	Electrical Measurements and instrumentation Lab	0	0	2				25		25	50	1
8	KEE353	Electrical Workshop	0	0	2				25		25	50	1
9	KEE354	Mini Project or Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	Computer System Security/Python Programming	2	0	0	15	10	25		50			0
11		MOOCs (Essential for Hons. Degree)											
		Total										**950**	**22**

**The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.*

SEMESTER IV													
Sl. No.	**Subject Codes**	**Subject**	**Periods**			**Evaluation Scheme**				**End Semester**		**Total**	**Credit**
			L	**T**	**P**	**CT**	**TA**	**Total**	**PS**	**TE**	**PE**		
1	KAS402/ KOE041-48	Maths IV/Engg. Science Course	3	1	0	30	20	50		100		150	4
2	KVE401/ KAS401	Universal Human Values/Technical Communication	3 2	0 1	0 0	30	20	50		100		150	3
3	KEE401	Digital Electronics	3	0	0	30	20	50		100		150	3
4	KEE402	Electrical Machines-I	3	1	0	30	20	50		100		150	4
5	KEE403	Networks Analysis & Synthesis	3	1	0	30	20	50		100		150	4
6	KEE451	Circuit Simulation Lab	0	0	2				25		25	50	1
7	KEE452	Electrical Machines - I Lab	0	0	2				25		25	50	1
8	KEE453	Digital Electronics Lab	0	0	2				25		25	50	1
9	KNC402/ KNC401	Python Programming/ Computer System Security	2	0	0	15	10	25		50			0
10		MOOCs (Essential for Hons. Degree)											
		Total										**900**	**21**

Semester-III

ELECTROMAGNETIC FIELD THEORY

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Apply different coordinate systems and their application in electromagnetic field theory, establish a relation between any two systems and also understand the vector calculus.	K_3
CO2	Understand the concept of static electric field. Understand the concept of current and properties of conductors. Establish boundary conditions and to calculate capacitances of different types of capacitors	K_4
CO3	Understand the concept of static magnetic field, magnetic scalar and vector potential	K_4
CO4	Understand the forces due to magnetic field, magnetization, magnetic boundary conditions and inductors.	K_4
CO5	Understand displacement current, time varying fields, propagation and reflection of EM waves and transmission lines.	K_3

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus:

UNIT I
Coordinate Systems and Transformation: Basics of Vectors: Addition, subtraction and multiplications; Cartesian, Cylindrical, Spherical transformation. Vector calculus: Differential length, area and volume, line surface and volume integrals, Del operator, Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes's theorem, Laplacian of a scalar.

Unit II
Electrostatic fields: Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses' Law- Maxwell's equation, Electric dipole and flux line, Energy density in electrostatic fields, Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, Dielectric-constants, Continuity equation and relaxation time, boundary conditions, Electrostatic boundary value problems: Poisson's and Laplace's equations., Methods of Images.

Unit III
Magneto statics : Magneto-static fields, Biot - Savart's Law, Ampere's circuit law, Maxwell's equation, Application of ampere's law, Magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential.

Unit IV
Magnetic forces: Materials and devices, Forces due to magnetic field, Magnetic torque and moment, a magnetic dipole. Magnetization in materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy.

Unit V

Waves and Applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, Displacement current, Maxwell's equation in final form Electromagnetic wave propagation: Wave propagation in loss dielectrics, Plane waves in lossless dielectrics Plane wave in free space. Plain waves in good conductors, Power and the pointing vector, Reflection of a plain wave in a normal incidence. Transmission Lines and Smith Chart.

Text Book: 1. MNO Sadiku, "Elements of Electromagnetic', Oxford University Press.

Reference Books: 1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.

ELECTRICAL MEASUREMENTS & INSTRUMENTATION

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Evaluate errors in measurement as well as identify and use different types of instruments for the measurement of voltage, current, power and energy.	K_1
CO2	Display the knowledge of measurement of electrical quantities resistance, inductance and capacitance with the help of bridges.	K_2
CO3	Demonstrate the working of instrument transformers as well as calculate the errors in current and potential transformers.	K_2
CO4	Manifest the working of electronic instruments like voltmeter, multi-meter, frequency meter and CRO.	K_2
CO5	Display the knowledge of transducers, their classifications and their applications for the measurement of physical quantities like motion, force, pressure, temperature, flow and liquid level.	K_3

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)

K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus:

UNIT I

Electrical Measurements: Measurement system, Characteristics of instruments, Methods of measurement, Errors in Measurement & Measurement standards, Review of indicating and integrating instruments: Voltmeter, Ammeter and Wattmeter.

UNIT II

Measurement of Resistance, Inductance and Capacitance: Measurement of low, medium and high resistances, insulation resistance measurement, AC bridges for inductance and capacitance measurement.

UNIT III

Instrument Transformers: Current and Potential transformer, ratio and phase angle errors, design considerations and testing.

UNIT IV

Electronic Measurements: Electronic instruments: Voltmeter, Multimeter, Wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Storage oscilloscope, Spectrum & Wave analyzer,Digital counter, frequency meter,and Digital Voltmeter.

UNIT V

Instrumentation: Transducers& sensors,classification & selection of sensors, Measurement of force using strain gauges, Measurement of pressure using piezoelectric sensor, Measurement of temperature using Thermistors and Thermocouples, Measurement of displacement using LVDT, Measurement of position using Hall effect sensors.Concept of signal conditioning and data acquisition systems, Concept of smart sensors and virtual instrumentation.

Text Book:

1. A K Sawhney, "Electrical & Electronic Measurement & Instrument", DhanpatRai&Sons, India
2. BC Nakra& K. Chaudhary, "Instrumentation, Measurement and Analysis," Tata McGraw Hill 2nd Edition
3. Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH

Reference Books:

1. Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
2. M. Stout , "Basic Electrical Measurement", Prentice Hall of India
3. WD Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
4. EW Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", AW Wheeler & Co. Pvt. Ltd. India

BASIC SIGNAL & SYSTEMS

Pre-requisites of course: Basic Electrical Engineering, Engineering Mathematics

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Represent the various types of signals & systems and can perform mathematical operations on them.	K_2
CO2	Analyze the response of LTI system to Fourier series and Fourier transform and to evaluate their applications to network analysis.	K_4
CO3	Analyze the properties of continuous time signals and system using Laplace transform and determine the response of linear system to known inputs.	K_4
CO4	Implement the concepts of Z transform to solve complex engineering problems using difference equations.	K_3

CO5	Develop and analyze the concept of state-space models for SISO & MIMO system.	K_4

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus:

UNIT I

Pre- Requisites: *Differential Equations.*

Introduction to Continuous Time Signals and Systems: Introduction to continuous time and discrete time signals, Classification of signals with their mathematical representation and characteristics. Transformation of independent variable, Introduction to various type of system, basic system properties.

Analogous System: Linear& Rotational mechanical elements, force-voltage and force-current analogy,

modeling of mechanical and electro-mechanical systems: Analysis of first and second order linear systems by classical method.

UNIT II

Pre- Requisites: *Fourier Series & Fourier Transform*

Fourier Transform Analysis: Exponential form and Compact trigonometric form of Fourier series, Fourier symmetry, Fourier transform: Properties, application to network analysis. Definition of DTFS, and DTFT, Sampling Theorem.

UNIT III

Pre- Requisites: *Laplace Transform*

Laplace Transform Analysis: Review of Laplace Transform, Properties of Laplace Transform, Initial & Final value Theorems, Inverse Laplace Transform, Convolution Theorem, Impulse response, Application of Laplace Transform to analysis of networks, waveform synthesis and Laplace Transform to complex waveforms

UNIT IV

Pre- Requisites:*Matrix Calculations.*

State – Variable analysis: Introduction, State Space representation of linear systems, Transfer function and state Variables, State Transition Matrix, Solution of state equations for homogeneous and non-homogeneous systems, Applications of State – Variable technique to the analysis of linear systems.

UNIT V

Pre- Requisite: *Z-Transforms.*

Z – Transform Analysis: Concept of Z – Transform& ROC, Z – Transform of common functions,
Inverse Z – Transform, Initial & Final value Theorems, Applications to solution of difference equations, Properties of Z-transform.

Text Books:

1. Oppenhiem, Wilsky, Nawab, "Signals & Systems", PHI
2. Anand Kumar, "Signals & Systems", PHI
3. Choudhary D. Roy, "Network & Systems", Wiley Eastern Ltd.

Reference Books:

1. David K. Cheng; "Analysis of Linear System", Narosa Publishing Co
2. Donald E. Scott, "Introduction to circuit Analysis" Mc. Graw Hill
3. BP Lathi, "Linear Systems & Signals" Oxford University Press, 2008.
4. IJ Nagrath, S.N. Saran, R. Ranjan and S. Kumar, "Signals and Systems", TataMc.Graw Hill, 2001.
5. ME Van-Valkenberg; " Network Analysis", Prentice Hall of India

ANALOG ELECTRONICS LAB

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Understand the characteristics and applications of the Semiconductor devices.	K_2, K_3
CO2	Draw the characteristics of BJT, FET and MOSFET.	K_2, K_4
CO3	Understand the parameters of Operational Amplifier and instrumentation Amplifier with their applications.	K_2, K_4
CO4	Understand the V-I characteristics of Power devices like SCR, TRIAC.	K_2, K_4

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

1. To Plot V-I characteristics of P-N junction diode and Zener diode.

2. To draw wave shape of the electrical signal at input and output points of the half wave, full wave and bridge rectifiers.

3. To Plot input / output characteristics for common base transistor.

4. To determine voltage gain, current gain, input impedance and output impedance and frequency response of R-C coupled common emitter amplifier.

5. To Plot input /output characteristics of FET and determine FET parameters at a given operating point.

6. To Plot input /output characteristics of MOSFET and determine MOSFET parameters at a given operating point.

7. To study transistor as a switch and determine load voltage and load current when the transistor is ON.

8. Measurement of Operational Amplifier Parameters: Common Mode Gain, Differential Mode Gain, CMRR, Slew Rate.

9. Applications of Op-amp: Op-amp as summing amplifier, Difference amplifier, Integrator and differentiator.

10. Study of Instrumentation Amplifier.

11. To plot V-I characteristics of SCR.

12. To plot V-I characteristics of TRIAC.

ELECTRICAL MEASUREMENT AND INSTRUMENTATION LAB

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Understand the importance of calibration of measuring instruments.	K2
CO2	Demonstrate the construction and working of different measuring instruments.	K3
CO3	Demonstrate the construction and working of different AC and DC bridges, along with their applications.	K3
CO4	Ability to measure electrical engineering parameters like voltage, current, power & phase difference in industry as well as in power generation, transmission and distribution sectors.	K2
CO5	Capability to analyze and solving the variety of problems in the field of electrical measurements.	K2

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Note : Minimum ten experiments are to be performed from the following list:

1. Calibration of AC voltmeter and AC ammeter.
2. Measurement of inductance using Maxwell's Bridge.
3. Measurement of capacitance using Schering Bridge.
4. Measurement of low resistance using Kelvin's Double Bridge.
5. Measurement of Power using CT and PT.
6. Measuring displacement using LVDT.

7. Measuring temperature using thermocouple.
8. Measuring pressure using piezoelectric pick up.
9. Measurement of speed of DC motor by photoelectric pick up.
10. Speed measurement using Hall Effect sensor.
11. PC based data logging of temperature sensor using LabVIEW/ MATLAB.
12. Signal conditioning of analog signal using LabVIEW/ MATLAB.

ELECTRICAL WORKSHOP

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Perform various types of Electrical connections.	K_3
CO2	Develop small circuits on PCB	K_6
CO3	Differentiate between various electrical wires, cables and accessories.	K_3
CO4	Demonstrate the layout of electrical substation & various safety measures.	K_2

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus:

Note: Minimum ten experiments are to be performed from the following list:

1. To study the working and Control of two lamps in series and in parallel
2. To perform the stair case working and it's testing.
3. To study the working principle and wiring of fluorescent lamp.
4. To study and wiring of distribution board including power plug using isolator, MCB, ELCB.
5. To study and estimate a typical, BHK house wiring.
6. Familiarization, soldering, testing and observing the wave forms on CRO of a HW and FW uncontrolled rectifier (using diodes) with capacitor filter.
7. Visit your college substation and familiarize the supply system, Transformer, HT Paneland Distribution etc.
8. To study construction, working and application of workshop tools. Also study the Electrical and Electronics Symbols.
9. To study the wires, cables and their gauges, Domestic Electrical Accessories.
10. Mini Project on PCB.
11. To study fault, Remedies in Domestic Installation and Indian Electricity Rules.
12. To study the different types of earthing system and measure the earth resistance.

Semester-IV

DIGITAL ELECTRONICS

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Apply concepts of Digital Binary System and implementation of Gates.	K_3
CO2	Analyze and design of Combinational logic circuits.	K_4
CO3	Analyze and design of Sequential logic circuits with their applications.	K_4
CO4	Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits.	K_3
CO5	Apply the concept of Digital Logic Families with circuit implementation.	K_3

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus

UNIT I
Digital System And Binary Numbers: Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, the map method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).

UNIT II
Combinational Logic: Combinational Circuits: Analysis Procedure, Design procedure, Binary adder-subtractor, Decimal adder, Binary multiplier, Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders.

UNIT III
Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

UNIT IV
Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, Design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

UNIT V
Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL; CPLD and FPGA.

Text Books:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.

ELECTRICAL MACHINES – I

Pre-requisites of course: Basic Electrical Engineering, Engineering Mathematics

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Analyze the various principles & concepts involved in Electromechanical Energy conversion.	K_4
CO2	Demonstrate the constructional details of DC machines as well as transformers, and principle of operation of brushless DC motor, Stepper and DC Servo motors.	K_2
CO3	Evaluate the performance and characteristics of DC Machine as motor and as well as generator.	K_4
CO4	Evaluate the performance of transformers, individually and in parallel operation.	K_4
CO5	Demonstrate and perform various connections of three phase transformers.	K_3

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus:

UNIT I

Pre- Requisites: *Magnetic Materials, BH characteristics*

Principles of Electro-mechanical Energy Conversion: Introduction, Review of magnetic system, Energy in Magnetic system, Force and torque in magnetic field system, Energy balance equation, Energy conversion via electrical field, Energy in a singly excited system, Determination of the Force and Torque from energy and co-energy, Generation of EMF in Machines, Torque in machine with cylindrical air gap.

UNIT II
Pre- Requisites: *Principle & Construction, Classification and circuit model, EMF equation of generator and torque equation of motor*

DC Machines: Armature winding (Concentrated and Distributed), Winding Factor, Armature reaction, Commutation, Interpoles and compensating windings, Performance characteristics of DC generators, Applications.

UNIT III
DC Machines (Contd.): Performance characteristics of DC motors, Starting of DC motors; 3 point and 4 point starters, Speed control of DC motors; Field control, Armature control and Voltage control (Ward Leonard method); Efficiency and Testing of DC machines (Hopkinson's and Swinburne's Test), Applications, ***Introduction to Brushless DC Motor, stepper motor and DC Servo motor and their applications.***

UNIT IV

Pre- Requisites: *Construction & Principle, Ideal and practical transformer, equivalent circuit & phasor diagram, losses in transformers.*

Single Phase Transformer: Efficiency and voltage regulation, all day efficiency, Excitation phenomenon and harmonics in transformers.
Testing of Transformers- O.C. and S.C. tests, Polarity test, Sumpner's test.
Auto Transformer- Single phase and three phase autotransformers, Volt-amp relation, Copper saving in autotransformer Efficiency, Merits & demerits and applications.

UNIT V
Pre- Requisite: *Three-phase connections – Star/Delta.*

Three Phase Transformers: Construction, Three phase transformer, phasor groups and their connections, open delta connection, three phase to 2 phase and their applications, Three winding transformers. Parallel operation of single phase and three phase transformers and load sharing.

Text Books:
1. IJ Nagrath & D.P. Kothari, "Electrical Machines", Tata McGraw Hill
2. Rajendra Prasad , "Electrical Machines", PHI
3. PS Bimbhra, "Electrical Machinery", Khanna Publisher
4. AE Fitggerald, C. Kingsley Jr and Umans, "Electric Machinery", McGraw Hill, International Student Edition.

Reference Books:
1. H. Cotton, "Electrical Technology", CBS Publication.
2. MG Say, "The Performance and Design of AC machines", Pit man& Sons.
3. PS Bimbhra, " Generalized Theory.

NETWORK ANALYSIS & SYNTHESIS

Pre-requisites of course: Basic Electrical Engineering, Basic signal & systems.

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Apply the knowledge of basic circuital law, nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach.	K_3
CO2	Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems.	K_4
CO3	Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods.	K_4
CO4	Demonstrate the concept of complex frequency and analyze the structure and function of one and two port network. Also evaluate and analysis two-port network parameters.	K_4
CO5	Synthesize one port network and analyze different filters.	K_4

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

Detailed Syllabus:

UNIT I

Graph Theory:

Pre- Requisites: *Basic circuital law, Mesh & Nodal analysis.*

Importance of Graph Theory in Network Analysis, Graph of a network, Definitions, planar &Non-Planar Graphs, Isomorphism, Tree, Co Tree, Link, basic loop and basic cutset, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of analysis.

Unit II

AC Network Theorems (Applications to dependent & independent sources):

Pre- Requisites: *Concepts of DC Network Theorems, Electrical Sources&Basic circuital law.*

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem, Tellegen's Theorem.

Unit III

Transient Circuit Analysis:

Pre- Requisites: *Laplace Transform& Concept of Initial conditions.*

Natural response and forced response, Transient response andsteady state response for arbitrary inputs (DC and AC), Evaluation of time response both through classical and Laplace methods.

Unit IV

Network Functions:

Pre- Requisites: *Concept of basic circuital law, parallel, series circuits.*

Concept of complex frequency, Transform impedances network functions of one port and two port networks, Concept of poles and zeros, Properties of driving point and transfer functions. Two Port Networks- Characterization of LTI two port networks; Z, Y,ABCD, A'B'C'D', g and h parameters, Reciprocity and symmetry, Inter-relationships between the parameters, Inter-connections of two port networks, Ladder and Lattice networks: T & Π representation, terminated two Port networks, Image Impedance.

Unit V

(a)Network Synthesis:

Pre- Requisites: *Laplace Transform, Concept of immittance functions.*

Positive real function; definition and properties, Properties of LC, RC and RL driving point functions, Synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

(b) Filters

Pre- Requisites: *Concept of Passive & active elements.*

Image parameters and characteristics impedance, Passive and active filter fundamentals, Low pass filters, High pass (constant K type) filters, Introduction to active filters.

Text Books:

1. ME Van Valkenburg, "Network Analysis", Prentice Hall of India.
2. Alexander, Sadiku, "Fundamentals of Electric Circuits", McGraw Hill.
3. D. Roy Choudhary, "Networks and Systems", Wiley Eastern Ltd.
4. CL Wadhwa, "Network Analysis and Synthesis", New Age International Publishers.
5. A. Chakrabarti, "Circuit Theory", Dhanpat Rai & Co.

Reference Books:

1. Hayt, Kimmerly, Durbin, "Engineering Circuit Analysis", McGraw Hill.
2. Donald E. Scott, "An Introduction to Circuit analysis: A System Approach", McGraw Hill.
3. ME Van Valkenburg, "An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.
4. T.S.K.V. Iyer, "Circuit Theory", Tata McGraw Hill.
5. Samarjit Ghosh, " Network Theory: Analysis & Synthesis" Prentice Hall India.

CIRCUIT AND SIMULATION LAB

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Apply the knowledge of basic circuital law, nodal and mesh analysis for given circuit.	K2
CO2	Analysis of the AC and DC circuits using simulation techniques.	K3
CO3	Analysis of transient response of AC circuits.	K3
CO4	Evaluation and analysis of two-port network parameters.	K2
CO5	Estimation of parameters of different filters.	K2

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

List of Experiments

Ten experiments to be performed

1) Verification of principle of Superposition with AC sources using Multisim/ PSPICE.
2) Verification of Thevenin and Maximum Power Transfer theorems in AC Circuits using Multisim/ PSPICE.
3) Verification of Norton theorems in ACCircuits using Multisim/ PSPICE.

4) Verification of Tellegen's theorem for two networks of the same topology using Multisim/ PSPICE.
5) Determination of Z and h-parameters (DC only) for a network and computation of Y and ABCD Parameters using Multisim/ PSPICE.
6) Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values using Multisim/ PSPICE.
7) Determination of transient response of current in RL and RC circuits with step voltageinput.
8) Determination of transient response of current in RLC circuit with step voltage inputforunder damped, critically damped and over damped cases.
9) Determination of image impedance and characteristic impedance of T and Πnetworks, using O.C. and S.C. tests.
10) Verification of parameter properties in inter-connected two port networks: series, paralleland cascade using Multisim/ PSPICE.
11) Determination of frequency response of a Twin – T-notch filter.
12) To determine attenuation characteristics of a low pass / high pass active filters.

ELECTRICAL MACHINES-I LAB

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Analyze and conduct basic tests on DC Machines and single-phase Transformer	K2
CO2	Obtain the performance indices using standard analytical aswell as graphical methods.	K3
CO3	Determine the magnetization, Load and speed-torque characteristics of DC Machines.	K3
CO4	Demonstrate procedures and analysis techniques to perform electromagnetic and electromechanical tests on electrical machines.	K2

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

List of Experiments

Note: Minimum ten experiments are to be performed from the following list, out of which there should be at least two software-based experiments.

1. To obtain magnetization characteristics of a DC shunt generator.
2. To obtain load characteristics of a DC shunt generator andcompound generator (a) Cumulatively compounded (b) Differentially compounded.
3. To obtain efficiency of a DC shunt machine using Swinburne's test.
4. To perform Hopkinson's test and determine losses and efficiency of DC machine.
5. To obtain speed- torque characteristics of a DC shunt motor.
6. To obtain speed control of DC shunt motor using (a) armature resistance control (b) field control
7. To obtain speed control of DC separately excited motor using Ward-Leonard.
8. To obtain equivalent circuit, efficiency and voltage regulation of a single-phase transformer using O.C. and S.C. tests.
9. To obtain efficiency and voltage regulation of a single-phase transformer by Sumpner's test.
10. To obtain 3-phase to2-phase conversion by Scott connection.
11. To demonstrate the parallel operation of three phase transformer and to obtain the load sharing at a load.

Institute may add any two software-based experiments [Develop computer Program in 'C' language

DIGITAL ELECTRONICS LAB

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Understanding of Digital Binary System and implementation of Gates.	K_2 , K_3
CO2	Design the Sequential circuits with the help of combinational circuits and feedback element.	K_3, K_4
CO3	Design data selector circuits with the help of universal Gates.	K_3, K_4
CO4	Design the counters with the help of sequential circuit and basic Gates.	K_3, K_4
CO5	Implement the projects using the digital ICs and electronics components.	K_3, K_5

KL- Bloom's Knowledge Level (K_1, K_2, K_3, K_4, K_5, K_6)
K_1 – Remember K_2 – Understand K_3 – Apply K_4 – Analyze K_5 – Evaluate K_6 – Create

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.

2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.

3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.

4. Implementation and verification of Decoder using logic gates.

5. Implementation and verification of Encoder using logic gates.

6. Implementation of 4:1 multiplexer using logic gates.

7. Implementation of 1:4 demultiplexer using logic gates.

8. Implementation of 4-bit parallel adder using 7483 IC.

9. Design, and verify the 4-bit synchronous counter.

10. Design, and verify the 4-bit asynchronous counter.

11. Implementation of Mini Project using digital integrated circuit's and other components.

Engineering Science Courses for B. Tech. (AICTE Model Curriculum) 2nd Year
(Effective from the session 2020-21)

SEMESTER- III/IV													
Sl.No.	**Subject Codes**	**Subject**	**Periods**	**Evaluation Scheme**					**End Semester**			**Total**	**Credit**
			L	**T**	**P**	**CT**	**TA**	**Total**	**PS**	**TE**	**PE**		
1	KOE031/041	Engineering Mechanics	3	1	0	30	20	50		100		150	4
2	KOE032/042	Material Science	3	1	0	30	20	50		100		150	4
3	KOE033/043	Energy Science & Engineering	3	1	0	30	20	50		100		150	4
4	KOE034/044	Sensor & Instrumentation	3	1	0	30	20	50		100		150	4
5	KOE035/045	Basics Data Structure & Algorithms	3	1	0	30	20	50		100		150	4
6	KOE036/046	Introduction to Soft Computing	3	1	0	30	20	50		100		150	4
7	KOE037/047	Analog Electronics Circuits	3	1	0	30	20	50		100		150	4
8	KOE038/048	Electronics Engineering	3	1	0	30	20	50		100		150	4

Sl.No.	**Subject**	
1	Engineering Mechanics	To be offered to any Engg. Branch except ME/CE/AG and allied branches
2	Material Science	
3	Energy Science & Engineering	To be offered to any Engg. Branch except EE and allied branches
4	Sensor & Instrumentation	
5	Basics Data Structure & Algorithms	To be offered to any Engg. Branch except CSE and allied branches
6	Introduction to Soft Computing	
7	Analog Electronics Circuits	To be offered to any Engg. Branch except EC and allied branches
8	Electronics Engineering	

Important Note: CH/BT/TX Engg. and allied branches can be offered any of the above listed ES.

ENGINEERING MECHANICS

UNIT-I:

Two-dimensional force systems: Basic concepts, Laws of motion, Principle of transmissibility of forces, transfer of a force to parallel position, resultant of a force system, simplest resultant of two dimensional concurrent and non-concurrent force systems, distribution of force systems, free body diagrams, equilibrium and equations of equilibrium.

Friction: Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction.

UNIT-II:

Beam: Introduction, shear force and bending moment, different equations of equilibrium, shear force and bending moment diagram for statically determined beams.

Trusses: Introduction, simple truss and solution of simple truss, methods of F-joint and methods of sections.

UNIT-III:

Centroid and moment of inertia: Centroid of plane, curve, area, volume and composite bodies, moment of inertia of plane area, parallel axis theorem, perpendicular axis theorem, principle moment of inertia, mass moment of inertia of circular ring, disc, cylinder, sphere, and cone about their axis of symmetry.

UNIT-IV:

Kinematics of rigid body: Introduction, plane motion of rigid body, velocity and acceleration under translational and rotational motion, relative velocity.

Kinetics of rigid body: Introduction, force, mass and acceleration, work and energy, impulse and momentum, D'Alembert's principle and dynamic equilibrium.

UNIT-V:

Simple stress and strain: Introduction, normal and shear stresses, stress-strain diagrams for ductile and brittle material, elastic constants, one-dimensional loading of members of varying cross sections, strain energy.

Pure bending of beams: Introduction, simple bending theory, stress in beams of different cross sections.

Torsion: Introduction, torsion of shafts of circular cross sections, torque and twist, shear stress due to torque.

Books and References:

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010).
3. A Textbook of Engineering Mechanics, R.K. Bansal, Laxmi Publications.
4. Engineering Mechanics, R.S. Khurmi, S.Chand Publishing.
5. Meriam J.L. and Kraige L.G., "Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons (1993).
6. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3 rd Edition, Vikas Publishing House Pvt. Ltd., (2005).
7. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, (1998).
8. Engineering mechanics by Irving H. Shames, Prentice-Hall.

MATERIAL SCIENCE

UNIT-I:

Phase Diagrams:

Solid solutions – Hume Rothery's rules – the phase rule – single component system – one-component system of iron – binary phase diagrams – isomorphous systems – the tie-line rule – the lever rule – application to isomorphous system – eutectic phase diagram – peritectic phase diagram – other invariant reactions – free energy composition curves for binary systems – microstructural change during cooling.

UNIT-II:

Ferrous Alloys:

The iron-carbon equilibrium diagram – phases, invariant reactions – microstructure of slowly cooled steels – eutectoid steel, hypo and hypereutectoid steels – effect of alloying elements on the Fe-C system – diffusion in solids – Fick's laws – phase transformations – T-T-T-diagram for eutectoid steel – pearlitic, baintic and martensitic transformations – tempering of martensite – steels – stainless steels – cast irons.

UNIT-III:

Mechanical Properties:

Tensile test – plastic deformation mechanisms – slip and twinning – role of dislocations in slip – strengthening methods – strain hardening – refinement of the grain size – solid solution strengthening – precipitation hardening – creep resistance – creep curves – mechanisms of creep – creep-resistant materials – fracture – the Griffith criterion – critical stress intensity factor and its determination – fatigue failure – fatigue tests – methods of increasing fatigue life – hardness – Rockwell and Brinell hardness – Knoop and Vickers microhardness.

UNIT-IV:

Magnetic, Dielectric & Superconducting Materials:

Ferromagnetism – domain theory – types of energy – hysteresis – hard and soft magnetic materials – ferrites – dielectric materials – types of polarization – Langevin-Debye equation – frequency effects on polarization – dielectric breakdown – insulating materials – Ferroelectric materials – superconducting materials and their properties.

UNIT-V:

New Materials:

Ceramics – types and applications – composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics – metallic glasses: types , glass forming ability of alloys, melt spinning process, applications – shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications – carbon nanotubes: types.

Text Books & References:

1. Balasubramanian, R. ―Callister's Materials Science and Engineering‖. Wiley India Pvt. Ltd., 2014.
2. Raghavan, V. ―Physical Metallurgy: Principles and Practice‖. PHI Learning, 2015.
3. Raghavan, V. ―Materials Science and Engineering: A First course‖. PHI Learning, 2015.
4. Askeland, D. ―Materials Science and Engineering‖. Brooks/Cole, 2010.
5. Smith, W.F., Hashemi, J. & Prakash, R. ―Materials Science and Engineering‖. Tata McGraw Hill Education Pvt. Ltd., 2014.
6. Wahab, M.A. ―Solid State Physics: Structure and Properties of Materials‖. Narosa Publishing House, 2009.

Energy Science and Engineering

Unit-I Energy and its Usage: Units and scales of energy use, Mechanical energy and transport, Heat energy: Conversion between heat and mechanical energy, Electromagnetic energy: Storage, conversion, transmission and radiation, Introduction to the quantum, energy quantization, Energy in chemical systems and processes, flow of CO2, Entropy and temperature, carnot and Stirling heat engines, Phase change energy conversion, refrigeration and heat pumps, Internal combustion engines, Steam and gas power cycles, the physics of power plants. Solid-state phenomena including photo, thermal and electrical aspects

Unit-II Nuclear Energy: Fundamental forces in the universe, Quantum mechanics relevant for nuclear physics, Nuclear forces, energy scales and structure, Nuclear binding energy systematics, reactions and decays, Nuclear fusion, Nuclear fission and fission reactor physics, Nuclear fission reactor design, safety, operation and fuel cycles

Unit-III Solar Energy: Introduction to solar energy, fundamentals of solar radiation and its measurement aspects, Basic physics of semiconductors, Carrier transport, generation and recombination in semiconductors, Semiconductor junctions: metal-semiconductor junction & p-n junction, Essential characteristics of solar photovoltaic devices, First Generation Solar Cells, Second Generation Solar Cells, Third Generation Solar Cells

Unit-IV Conventional & non-conventional energy source: Biological energy sources and fossil fuels, Fluid dynamics and power in the wind, available resources, fluids, viscosity, types of fluid flow, lift, Wind turbine dynamics and design, wind farms, Geothermal power and ocean thermal energy conversion, Tidal/wave/hydro power

Unit-V Systems and Synthesis: Overview of World Energy Scenario, Nuclear radiation, fuel cycles, waste and proliferation, Climate change, Energy storage, Energy conservation. Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts, LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption

Reference/Text Books

1. Energy and the Challenge of Sustainability, World Energy Assessment, UNDP, New York, (2000).
2. Perspective of Modern Physics, A. Beiser, McGraw-Hill International Editions (1968).
3. Introduction to Modern Physics, H.S. Mani and G.K.Mehta, East-West Press (1988).
4. Introduction to Electrodynamics, D. J. Griffiths, Fourth Edition, Prentice Hall (2013).
5. Introductory Nuclear Physics, R. K. Puri and V.K. Babbar, Narosa Publishing House (1996).
6. Physics of Solar Cells: From Basic Principles to Advanced Concepts by Peter Wurfel, John Wiley & Sons, 2016
7. Principles of Solar Engineering, D.Y. Goswami, F.Kreith and J.F. Kreider, Taylor and Francis, Philadelphia, 2000.

SENSOR AND INSTRUMENTATION

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:		**Knowledge Level, KL**
Upon the completion of the course, the student will be able to:		
CO 1	Apply the use of sensors for measurement of displacement, force and pressure.	K_3
CO2	Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.	K_3
CO3	Demonstrate the use of virtual instrumentation in automation industries.	K_2
CO4	Identify and use data acquisition methods.	K_3
CO5	Comprehend intelligent instrumentation in industrial automation.	K_2

Detailed Syllabus:

Unit- I:
Sensors & Transducer: Definition, Classification & selection of sensors, Measurement of displacement using Potentiometer, LVDT & Optical Encoder, Measurement of force using strain gauge, Measurement of pressure using LVDT based diaphragm & piezoelectric sensor.

Unit-II:
Measurement of temperature using Thermistor, Thermocouple & RTD, Concept of thermal imaging, Measurement of position using Hall effect sensors, Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor, Flow Sensors: Ultrasonic & Laser, Level Sensors: Ultrasonic & Capacitive.

Unit -III:
Virtual Instrumentation: Graphical programming techniques, Data types, Advantage of Virtual Instrumentation techniques, Concept of WHILE & FOR loops, Arrays, Clusters & graphs,
Structures: Case, Sequence & Formula nodes, Need of software based instruments for industrial automation.

Unit-IV:
Data Acquisition Methods: Basic block diagram, Analog and Digital IO, Counters, Timers, Types of ADC: successive approximation and sigma-delta, Types of DAC: Weighted Resistor and R-2R Ladder type, Use of Data Sockets for Networked Communication.

Unit V:
Intelligent Sensors: General Structure of smart sensors & its components, Characteristic of smart sensors: Self calibration, Self-testing & self-communicating, Application of smart sensors: Automatic robot control & automobile engine control.

Text Books:

1. DVS Murthy, Transducers and Instrumentation, PHI 2nd Edition 2013
2. D Patranabis, Sensors and Transducers, PHI 2nd Edition 2013.
3. S. Gupta, J.P. Gupta / PC interfacing for Data Acquisition & Process Control, 2nd ED / Instrument Society of America, 1994.
4. Gary Johnson / Lab VIEW Graphical Programing II Edition / McGraw Hill 1997.

Reference Books:

1. Arun K. Ghosh, Introduction to measurements and Instrumentation, PHI, 4th Edition 2012.
2. A.D. Helfrick and W.D. cooper,Modern Electronic Instrumentation & Measurement Techniques, PHI – 2001
3. Hermann K.P. Neubert, "Instrument Transducers" 2nd Edition 2012, Oxford University Press.

Basics Data Structure and Algorithms

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Understand and analyze the time and space complexity of an algorithm	K_2, K_4
CO 2	Understand and implement fundamental algorithms (including sorting algorithms, graph algorithms, and dynamic programming)	K_2, K_3
CO 3	Discuss various algorithm design techniques for developing algorithms	K_1, K_2
CO 4	Discuss various searching, sorting and graph traversal algorithms	K_2, K_3
CO 5	Understand operation on Queue , Priority Queue , D-Queue.	K_2

K_1- Remember, K_2- Understand, K_3- Apply, K_4- Analyze, K_5- Evaluate, K6- Create

Basics Data Structure and Algorithms

Detailed Syllabus

Unit	Topic	Proposed Lecture
I	**Introduction to data structure and Algorithms:** Performance analysis of Algorithm, time complexity, Big-oh notation, Elementary data organization data structure operations, Recurrences, Arrays, Operation on arrays, representation of arrays in memory, single dimensional and multidimensional arrays, spare matrices, Character storing in C, String operations.	08
II	**Stack And Queue and Link List:** Stack operation, PUSH and POP, Array representation of stacks, Operation associated with stacks Application of stacks, Recursion, Polish experession, Representation Queue, operation on Queue , Priority Queue , D-Queue , Singly and circularly linked list, List operations Lists implementations	08
III	**Trees** : Basic terminology, Binary Trees, Binary tree representation, Algebraic/expressions, Complete Binary Trees, Extended binary tree, representing binary tress in memory, linked representation of Binary trees, Traversing binary trees & Searching in binary trees, Inserting in binary search trees, Complexity of searching algorithm, Heaps, general trees, Threaded binary tree.	08
IV	**Graphs:** Terminology & representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, adjacency Matrices, Transversal, connected component and spanning trees, Minimum Cost spanning tree, Prims and Kruskal Algorithm, BFS, DFS, Shortest path and transitive closure, Activity networks, topological sort and critical paths.	08
V	**Searching and Sorting:** Linear search, binary Search, Internal and External sorting, Bubble sorting, selection sort, Insertion sort, quick sort, Two way merge sort, Heap sort, sorting on different keys, practical consideration for internal sorting, External Sorting, Storage Devices : Magnetic tapes, Disk Storage, Sorting with disks and Indexing techniques, introduction to B tree and B+ tree, File organization and storage management, Introduction to hoisting.	08

Text books:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, Introduction to Algorithms, PHI.
2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication.
3. Weiss, "Data Structure & Algorithm Analysis in C", Addision Wesley.
4. Basse, "computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
5. Lipschutz, "Data structure, "Schaum series.
6. Aho, hopcropt, Ullman, "Data Structure & Algorithm", Addision Wesley.
7. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008

Introduction to Soft Computing

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to understand		
CO 1	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.	K_1, K_2
CO 2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic	K_2, K_3
CO 3	Describe with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.	K_4
CO 4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.	K_2, K_3
CO 5	Develop some familiarity with current research problems and research methods in Soft Computing Techniques.	K_5, K_6

K_1- Remember, K_2- Understand, K_3- Apply, K_4- Analyze, K_5- Evaluate, K6- Create

Introduction to Soft Computing		
Detailed Syllabus		
Unit	**Topic**	**Proposed Lecture**
I	Introduction to Soft Computing, **ARTIFICIAL NEURAL NETWORKS** Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohnen's self-organizing networks - Hopfield network.	08
II	**FUZZY SYSTEMS** Fuzzy sets, Fuzzy Relations and Fuzzy reasoning, Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.	08
III	**NEURO - FUZZY MODELING** Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing – Evolutionary computation	08
IV	**GENETIC ALGORITHMS** Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction - Rank method - Rank space method.	08
V	**APPLICATION OF SOFT COMPUTING** Optimiation of traveling salesman problem using Genetic Algorithm, Genetic algorithm based Internet Search Techniques, Soft computing based hybrid fuzzy controller, Introduction to MATLAB Environment for Soft computing Techniques.	08

Text books:

1. An Introduction to Genetic Algorithm Melanic Mitchell (MIT Press)
2. Evolutionary Algorithm for Solving Multi-objective, Optimization Problems (2nd Edition), Collelo, Lament, Veldhnizer (Springer)
3. Fuzzy Logic with Engineering Applications Timothy J. Ross (Wiley)
4. Neural Networks and Learning Machines Simon Haykin (PHI)
5. Sivanandam, Deepa, " Principles of Soft Computing", Wiley
6. Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall
7. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill
8. Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall
9. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley
10. Wang, "Fuzzy Logic", Springer

Analog Electronics Circuits	3L:1T:0P	4 Credits

Unit	Topics	Lectures
I	Diode circuits, amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.	8
II	High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier, various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues, feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.	8
III	Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.	8
IV	Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load, differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR, Op-Amp design: Design of differential amplifier for a given specification, design of gain stages and output stages, compensation.	8
V	Op-Amp applications: Review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications, active filters: Low pass, high pass, band pass and band stop, design guidelines.	8

Text/Reference Books:

1. J.V. Wait, L.P. Huelsman and GA Korn, "Introduction to Operational Amplifier theory and applications," McGraw Hill, 1992.
2. J. Millman and A. Grabel, "Microelectronics," 2nd edition, McGraw Hill, 1988.
3. P. Horowitz and W. Hill, "The Art of Electronics," 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, "Microelectronic Circuits,"Saunder's College11 Publishing, 4th edition.
5. Paul R. Gray and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits," John Wiley, 3rd edition.
6. Muhammad H. Rashid, "Electronic Devices and Circuits," Cengage publication, 2014.

Course Outcomes:

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

1. Understand the characteristics of diodes and transistors.
2. Design and analyze various rectifier and amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.
5. Design LPF, HPF, BPF, BSF.

Electronics Engineering	3L:1T:0P	4 Credits

Unit	Topics	Lectures
I	PN junction diode: Introduction of semiconductor materials; Semiconductor diode: Depletion layer, V-I characteristics, ideal and practical, diode resistance, capacitance, diode equivalent circuits, transition and diffusion capacitance, Zener diodes breakdown mechanism (Zener and avalanche).	8
II	Diode application: Series, parallel and series, parallel diode configuration, half and full wave rectification, clippers, clampers, Zener diode as shunt regulator, voltage-multiplier circuits special purpose two terminal devices : light-emitting diodes, Varactor (Varicap) diodes, tunnel diodes, liquid-crystal displays.	8
III	Bipolar junction transistors and field effect transistor: Bipolar junction transistor: Transistor construction, operation, amplification action, common base, common emitter, common collector configuration dc biasing BJTs: operating point, fixed-bias, emitter bias, voltage-divider bias configuration. Collector feedback, emitter-follower configuration. Bias stabilization. CE, CB, CC amplifiers and AC analysis of single stage CE amplifier (re Model), Field effect transistor: Construction and characteristic of JFETs. AC analysis of CS amplifier, MOSFET (depletion and enhancement) type, transfer characteristic.	8
IV	Operational amplifiers: Introduction and block diagram of Op-Amp, ideal & practical characteristics of Op-Amp, differential amplifier circuits, practical Op-Amp circuits (inverting amplifier, non-inverting amplifier, unity gain amplifier, summing amplifier, integrator, differentiator), Op-Amp parameters: input offset voltage, output offset voltage, input biased current, input offset current differential and common-mode operation.	8
V	Electronic instrumentation and measurements: Digital voltmeter: Introduction, RAMP techniques digital multimeters: Introduction Oscilloscope: introduction, basic principle, CRT, block diagram of oscilloscope, simple, measurement of voltage, current phase and frequency using CRO, introduction of digital storage oscilloscope and comparison of DSO with analog oscilloscope.	8

Text /Reference Books:

1. Robert L. Boylestand / Louis Nashelsky, "Electronic Devices and Circuit Theory," Latest Edition, Pearson Education.
2. H S Kalsi, "Electronic Instrumentation", Latest Edition, TMH Publication.
3. Meetidehran/ A.K. singh "fundamental of electronics Engineering", New age international publisher.

Course Outcomes:

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

1. Understand the concept of PN junction and special purpose diodes.
2. Study the application of conventional diode and semiconductor diode.
3. Analyse the I-V characteristics of BJT and FET.
4. Analyzethe of Op-Amp, amplifiers, integrator, and differentiator.
5. Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope

Mathematics-IV
(PDE, Probability and Statistics)
Computer/Electronics/Electrical & Allied Branches, CS/IT, EC/IC, EE/EN, Mechanical& Allied Branches, (ME/AE/AU/MT/PE/MI/PL) Textile/Chemical & Allied Branches, TT/TC/CT, CHE/FT

Subject Code	KAS302/KAS402					
Category	Basic Science Course					
Subject Name	MATHEMATICS-IV					
Scheme and Credits	**L-T-P**	**Theory Marks**	**Sessional**		**Total**	**Credit**
			Test	**Assig/Att.**		
	3—1—0	100	30	20	150	4
Pre- requisites (if any)	Knowledge of Mathematics I and II of B. Tech or equivalent					

Course Outcomes

The objective of this course is to familiarize the students with partial differential equation, their application and statistical techniques. It aims to present the students with standard concepts and tools at an intermediate to superior level that will provide them well towards undertaking a variety of problems in the discipline.

The students will learn:

- The idea of partial differentiation and types of partial differential equations
- The idea of classification of second partial differential equations, wave , heat equation and transmission lines
- The basic ideas of statistics including measures of central tendency, correlation, regression and their properties.
- The idea s of probability and random variables and various discrete and continuous probability distributions and their properties.
- The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties.

Module I: Partial Differential Equations

Origin of Partial Differential Equations, Linear and Non Linear Partial Equations of first order, Lagrange's Equations, Charpit's method, Cauchy's method of Characteristics, Solution of Linear Partial Differential Equation of Higher order with constant coefficients, Equations reducible to linear partial differential equations with constant coefficients.

Module II: Applications of Partial Differential Equations:

Classification of linear partial differential equation of second order, Method of separation of variables, Solution of wave and heat conduction equation up to two dimension, Laplace equation in two dimensions, Equations of Transmission lines.

Module III: Statistical Techniques I:

Introduction: Measures of central tendency, Moments, Moment generating function (MGF) , Skewness, Kurtosis, Curve Fitting , Method of least squares, Fitting of straight lines, Fitting of second degree parabola, Exponential curves ,Correlation and Rank correlation, Regression Analysis: Regression lines of y on x and x on y, regression coefficients, properties of regressions coefficients and non linear regression.

Module IV: Statistical Techniques II:

Probability and Distribution: Introduction, Addition and multiplication law of probability, Conditional probability, Baye's theorem, Random variables (Discrete and Continuous Random variable) Probability mass function and Probability density function, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poission and Normal distributions.

Module V: **Statistical Techniques III:**

Sampling, Testing of Hypothesis and Statistical Quality Control: Introduction , Sampling Theory (Small and Large) , Hypothesis, Null hypothesis, Alternative hypothesis, Testing a Hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, T-test, F-test and Chi-square test, One way Analysis of Variance (ANOVA).Statistical Quality Control (SQC) , Control Charts , Control Charts for variables ($\bar{X}$ and R Charts), Control Charts for Variables (p, np and C charts).

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
3. S. Ross: A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

Reference Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2.T.Veerarajan : Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi.
3. R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.
4. J.N. Kapur: Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.
5. D.N.Elhance,V. Elhance & B.M. Aggarwal: Fundamentals of Statistics; Kitab Mahal Distributers, New Delhi.

COURSE OUTCOMES

	Course Outcome (CO)	Bloom's Knowledge Level (KL)
	At the end of this course, the students will be able to:	
CO 1	Remember the concept of partial differential equation and to solve partial differential equations	K_1& K_3
CO 2	Analyze the concept of partial differential equations to evaluate the problems concerned with partial differential equations	K_4 & K_5
CO 3	Understand the concept of correlation, moments, skewness and kurtosis and curve fitting	K_2
CO 4	Remember the concept of probability to evaluate probability distributions	K_1 & K_5
CO 5	Apply the concept of hypothesis testing and statistical quality control to create control charts	K_3 & K_6

K_1 – Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5 – Evaluate, K_6 – Create

Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quiz.
c. Tutorials and assignments.
d. Sessional examination.
e. Final examination.

Award of Internal/External Marks:

Assessment procedure will be as follows:

1. These will be comprehensive examinations held on-campus (Sessionals).
2. Quiz.
   a. Quiz will be of type multiple choice, fill-in-the-blanks or match the columns.
   b. Quiz will be held periodically.
3. Tutorials and assignments
   a. The assignments/home-work may be of multiple choice type or comprehensive type at least one assignment from each Module/Unit.
   b. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.
4. Final examinations. These will be comprehensive external examinations held on-campus or off campus (External examination) on dates fixed by the Dr. APJ Abdul Kalam Technical University, Lucknow.

Technical Communication
(KAS301/401)
(Effective from the session 2020-21)

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Unit -1 Fundamentals of Technical Communication:
Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

Unit - II Forms of Technical Communication:
Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration, C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Unit - III Technical Presentation: Strategies & Techniques
Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Unit - IV Technical Communication Skills:
Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

Unit - V Dimensions of Oral Communication & Voice Dynamics:
Code and Content; Stimulus & Response; Encoding process; Decoding process; Pronunciation Etiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow in Speaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes: Empathy; Considerateness; Leadership; Competence.

Reference Books

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
2. Personality Development and Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.
3. Spoken English- A Manual of Speech and Phonetics by R.K.Bansal & J.B.Harrison, Orient Blackswan, 2013, New Delhi.
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.

6. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.
7. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
8. Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.
9. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

Course Outcomes

1. Students will be enabled to **understand** the nature and objective of Technical Communication relevant for the work place as Engineers.
2. Students will **utilize** the technical writing for the purposes of Technical Communication and its exposure in various dimensions.
3. Students would imbibe inputs by presentation skills to **enhance** confidence in face of diverse audience.
4. Technical communication skills will **create** a vast know-how of the application of the learning to promote their technical competence.
5. It would enable them to **evaluate** their efficacy as fluent & efficient communicators by learning the voice-dynamics.

VEER BAHADUR SINGH PURVANCHAL UNIVERSITY JAUNPUR, UTTAR PRADESH

EVALUATION SCHEME & SYLLABUS FOR

B. TECH. 2nd YEAR ELECTRICAL ENGINEERING

Syllabus of Non Credit Courses

BASED ON

AICTE MODEL CURRICULUM

[Effective from the Session: 2020-21]

DETAILED SYLLABUS

COMPUTER SYSTEM SECURITY		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats	**K_1, K_2**
CO 2	To discover cyber attack scenarios to web browsers and web servers and to explain how to mitigate such threats	**K_2**
CO 3	To discover and explain mobile software bugs posing cyber security threats, explain and recreate exploits, and to explain mitigation techniques.	**K_3**
CO 4	To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios	**K_4**
CO 5	To articulate the well known cyber attack incidents, explain the attack scenarios, and explain mitigation techniques.	**K_5, K_6**
DETAILED SYLLABUS		**3-1-0**

Unit	Topic	Proposed Lecture
I	**Computer System Security Introduction**: Introduction, What is computer security and what to l earn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase. **Hijacking & Defense:** Control Hijacking ,More Control Hijacking attacks integer overflow ,More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking - Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced Control Hijacking attacks.	08
II	**Confidentiality Policies:** Confinement Principle ,Detour Unix user IDs process IDs and privileges , More on confinement techniques ,System call interposition ,Error 404 digital Hacking in India part 2 chase , VM based isolation ,Confinement principle ,Software fault isolation , Rootkits ,Intrusion Detection Systems	08
III	**Secure architecture principles isolation and leas:** Access Control Concepts , Unix and windows access control summary ,Other issues in access control ,Introduction to browser isolation . **Web security landscape :** Web security definitions goals and threat models , HTTP content rendering .Browser isolation .Security interface , Cookies frames and frame busting, Major web server threats ,Cross site request forgery ,Cross site scripting ,Defenses and protections against XSS , Finding vulnerabilities ,Secure development.	08
IV	**Basic cryptography:** Public key cryptography ,RSA public key crypto ,Digital signature Hash functions ,Public key distribution ,Real world protocols ,Basic terminologies ,Email security certificates ,Transport Layer security TLS ,IP security , DNS security.	08
V	**Internet Infrastructure:** Basic security problems , Routing security ,DNS revisited ,Summary of weaknesses of internet security ,.Link layer connectivity and TCP IP connectivity , Packet filtering firewall ,Intrusion detection.	08

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Text books:

1. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.

2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.

3. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.

4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press, 2001.

Mapped With : https://ict.iitk.ac.in/product/computer-system-security/

PYTHON PROGRAMMING		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able to understand		
CO 1	To read and write simple Python programs.	K_1, K_2
CO 2	To develop Python programs with conditionals and loops.	K_2, K_4
CO 3	To define Python functions and to use Python data structures –- lists, tuples, dictionaries	K_3
CO 4	To do input/output with files in Python	K_2
CO 5	To do searching ,sorting and merging in Python	K_2, K_4
DETAILED SYLLABUS		**3-1-0**

Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** The Programming Cycle for Python , Python IDE, Interacting with Python Programs , Elements of Python, Type Conversion. **Basics:** Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.	**08**
II	**Conditionals:** Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation. **Loops:** Purpose and working of loops , While loop including its working, For Loop , Nested Loops , Break and Continue.	**08**
III	**Function:** Parts of A Function , Execution of A Function , Keyword and Default Arguments ,Scope Rules. **Strings :** Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings. **Python Data Structure :** Tuples , Unpacking Sequences , Lists , Mutable Sequences , List Comprehension , Sets , Dictionaries **Higher Order Functions:** Treat functions as first class Objects , Lambda Expressions	**08**

IV	**Sieve of Eratosthenes:** generate prime numbers with the help of an algorithm given by the Greek Mathematician named Eratosthenes, whose algorithm is known as Sieve of Eratosthenes. **File I/O :** File input and output operations in Python Programming **Exceptions and Assertions** **Modules :** Introduction , Importing Modules , **Abstract Data Types :** Abstract data types and ADT interface in Python Programming. **Classes :** Class definition and other operations in the classes , Special Methods (such as _init_, _str_, comparison methods and Arithmetic methods etc.) , Class Example , Inheritance , Inheritance and OOP.	**08**
V	**Iterators & Recursion:** Recursive Fibonacci , Tower Of Hanoi **Search :** Simple Search and Estimating Search Time , Binary Search and Estimating Binary Search Time **Sorting & Merging:** Selection Sort , Merge List , Merge Sort , Higher Order Sort	**08**

Text books:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)

2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

3.John V Guttag, ―Introduction to Computation and Programming Using Python‘‘, Revised and expanded Edition, MIT Press , 2013

4.Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

5.Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.

6.Kenneth A. Lambert, ―Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.

7.Charles Dierbach, ―Introduction to Computer Science using Python: A Computational ProblemSolving Focus, Wiley India Edition, 2013.

8.Paul Gries, Jennifer Campbell and Jason Montojo, ―Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.

Mapped With : https://ict.iitk.ac.in/product/python-programming-a-practical-approach/