Course of Study (New Syllabus)

Choice Based Credit System

S. Y. B. Tech. (Electrical Engineering)

(Effective from Academic Year 2015-16)

Department of Electrical Engineering,
SGGS Institute of Engineering and Technology, Vishnupuri,
Nanded-431606 (MS), India

(An autonomous institute established by Govt. of Maharashtra)

SGGS Institute of Engineering and Technology, Vishnupuri,Nanded

Department of Electrical Engineering

Choice Based Credit System

S. Y. B. Tech. (Electrical Engineering)

From Academic Year 2015-16

STRUCTURE

Semester-III					
Course Code	**Name of the Course**	**Lectures**	**Tutorials**	**Practical**	**Credits**
UMA201	Engineering Mathematics – III	4	-	-	4
UEE203	Analog and Digital Circuits	4	-	2	5
UEE205	Electrical Machine-I	4	-	2	5
UEE207	Electrical Measurement and Instrumentation	3	-	2	4
UEE209	Numerical Method using MATLAB	2	-	2	3
UHS222	Professional Communication	2	-	2	3
	Sub Total	**19**	**0**	**10**	**24**
Semester-IV					
Course Code	**Name of the Course**	**Lectures**	**Tutorials**	**Practical**	**Credits**
UMA202	Engineering Mathematics – IV (Elective I)	4	-	-	4
UEE204	Electrical Machine-II	4	-	2	5
UEE206	Power System Engineering	3	-	2	4
UEE208	Network Analysis	3	-	2	4
UEE210	Signals and System	3	1	-	4
UEE212	CAD Lab	-	-	2	1
UHS221	Human Values and Professional Ethics	2	-	-	2
	Sub Total	**19**	**1**	**08**	**24**
	Total	**38**	**1**	**18**	**48**

Elective I-

UMA 202A- Complex Analysis

UMA 202B- Statistics and Probability

UMA 202C- Discrete Mathematics

UMA 202D- Transforms and Z- Transform

Open Electives -

SEM III

1. Basic Electrical Wiring skill (L-3), (Pr-2)

SEM IV

1. Basics of Electrical Machines (L-3), (Pr-2)

Attendance Criteria: Students have to maintain 75% attendance in all the registered courses in a semester to be eligible for appearing examinations.

SEMESTER-III

Engineering Mathematics – III (Differential Equation)

L	T	P	Credits(Th)	Credits(P)	Total Credits
4	-	-	4	0	4

Prerequisite:

1. Knowledge of differentiation and integration.
2. Basic Knowledge of quadratic equation.

Course objectives:

To acquaint student with:

1. The basic concepts of ordinary differential equations, partial differential equations.
2. Mathematical Modelling in physical problems, Initial and boundary value problems.
3. To motivate students to use critical thinking skill to solve practical problems.

Course outcomes:

At the end of the course the student is expected to understand.

1. Importance of differential equation i.e. ODE and PDE in physical problems.
2. Able to solve IVP in electrical and mechanical problems.
3. Analysing physical phenomenon in engineering and technology by using this theory.

Syllabus:

Unit 1:

Basic Concepts & Ideas, Geometric Meaning of $y' = f(x, y)$, direction field , exact equations, Integrating factors, Linear differential equation, Bernoulli's equations, orthogonal trajectories, applications to electrical circuits.

Unit 2:

Second Order Differential equations, Homogeneous linear differential equation for real & complex roots, Euler Cauchy equation, existence & uniqueness theorem (Without proof) & Wronskian.

Unit 3:

Non homogeneous equation, solutions by undetermined coefficients & Variation of parameter methods, modeling, forced oscillation, resonance & electrical circuits, system of differential equations.

Unit 4:
Fourier series, Periodic function, Fourier theorem Euler's formulae for the Fourier coefficients, convergence of Fourier series, change of interval, even & odd function functions, half range Fourier series.

Unit 5:
Partial differential equations, Separation of Variables, Vibrations of string, one dimensional equation.

Text/Reference books:

- Advanced Engineering Mathematics – R.K Jain & S.R.K Iyenger
- Advanced Engineering Mathematics- Erwin Kreyszig
- Elementary Differential Equation(eighth edition) W.E Boyce & R. Diprima (John Wiley 2005)
- Fourier series & boundary Valued Problems., R.V Churchill & JW Brown (Seventh edition) McGraw Hill (2006).

.

UEE203Analog and Digital Circuits

L	T	P	Credits(Th)	Credits(P)	Total Credits
4	-	2	4	1	5

Prerequisite:

1. Knowledge regarding Physics
2. Knowledge of Number System
3. Knowledge about Basic Electronics

Course objectives:

1. Introduce students to the concepts and use of feedback and feedback (amplifier) design.
2. Extend student knowledge of the theory and applications of operational amplifier integrated circuits.
3. The primary goal is to provide in depth understanding of logic and system synthesis.
4. Enable student to implement simple logical operations using combinational logic circuits.
5. Impart the concepts of sequential circuits enabling student to analyse sequential systems in terms of state machines.
6. Enable student to implement synchronous state machines using flip-flops.

Course outcomes:

After completing this course the student will be:

1. Able to identify, analyse op-amp circuit topologies and discuss the relative properties of op-amp circuits.
2. Able to demonstrate the operation of simple logic gates.
3. Able to combine simple gates into more complex circuit.
4. Able to identify characteristics of different semiconductor devices.
5. Able to design Digital Circuits.

Syllabus:

Unit 1: (8 Hours)

BJT amplifier with reference to operational analysis of CE, CB and CC configuration, their input-output characteristics, biasing, frequency response and AC-DC load line analysis, Class A, B and AB push pull and complementary symmetry amplifier. Multistage BJT amplifier-direct, RC coupled and transformer coupled amplifier, Feedback amplifier, Darlington pair, FET-construction, Parameters, and Characteristics.

Unit 2: (6 Hours)

Op- Amp: Block diagrams, ideal and practical parameters,open loop and close loop configuration of Op-Amp. Applications of Op-Amp: Integrator, differentiator, Comparator, Schmitt trigger, Instrumentation amplifier, Precision rectifiers, Zero crossing detectors, V-I and I-V converters.

Unit 3: **(6 Hours)**

Waveform generation using Op-amp - sine, square, saw-tooth and triangular generator, peak detector, IC 555–construction, working and modes of operation– astable, monostable, multi-vibrators, Sequence generator, voltage regulators using ICs Viz. 78xx, 79xx, LM 317, Active filters-Its configuration with frequency response, Analysis of first order low pass and high pass filters.

Unit 4: **(8 Hours)**

Numbering Systems and Boolean algebra- numbering systems-binary, octal, decimal and hexadecimal and their conversion, codes-BCD, Greyand excess3, Binary arithmetic:- addition and subtraction by 1's and 2'scompliment.Revision of logic gates, Booleans algebra, De-Morgan's theory etc. K-map: -structure for two, three and four variables, SOP and POS form reduction of Boolean expressions by K-map 1-bit comparator analysis using K-map.

Unit 5: **(6 Hours)**

Flip flops – R-S, Clocked S-R, D latches, Edge triggered D flip-flops, Edge triggered JK flip flops, JK Master - slave flip flop, Registers and Counters, Buffer registers, shift registers, controlled shift registers, asynchronous counters, synchronous counter, twisted ring counters, N - module counters.

Unit 06: **(6 Hours)**

Multiplexer, De-multiplexer using K-map, ADC, Dual slope SAR,DAC-binary weighted, ladder type, Memories: RAM-static& dynamic, ROM, PROMS and EPROMS, EEPROMS detailing.

Text/Reference Books:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", Eighth edition, PHI publishers, 2004.
2. J. Millman and C. C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, Tata McGraw-Hill Publishing Company, 1988.
3. R.A. Gayakwad, Op-Amps & Linear Integrated Circuits, PHI, Fourth Edition, 2012
4. R.P.Jain, "Modern Digital Electronics" Tata McGraw Hill, Third Edition, 2003.

Term work:

It will consist of a record of at least eight experiments from the following list based on the prescribed syllabus.

1. Measurement of op-amp parameters and comparison with op-amp data sheets.
2. Assembling of op-amp inverting, non-inverting and differential circuit to measure an input inthe range of mill volts to few volts.
3. Transistor amplifiers: frequency response of BJT, multistage BJT amplifier and FET amplifier.
4. Op-amp as square, sine and triangular wave generator.
5. Op-amp as ZCD, Comparator and Schmitt trigger.
6. Instrumentation amplifier using 3 - op amp CMR measurement and precision rectifier
7. IC-555 applications- astable, monostable, sequence counter.

8. Study and verify shift register operation (IC 7495) and application of 7495 as pseudorandom no. generation
9. Voltage regulation of IC VR 78xx, 79xx and LM317
10. Study of counters, ring counter and twisted ring counter.
11. A to D and D to A converter using ADC 0809 and DAC 0808.
12. Study of up - down counters (IC 74192/74193) and N- modulo counter. (IC 7490/7493).
13. Study of various flip-flops and verification of truth table.
14. Study of Multiplexer and De-multiplexer.
15. Study of active filters- Low pass and high pass filters.

Practical Examination:

The examination will be of three hours duration and will consist of an experimentbased on term-work and followed by an oral based on above syllabus.

UEE205 Electrical Machines-I

L	T	P	Credits(Th)	Credits(P)	Total Credits
4	-	2	4	1	5

Prerequisite:

1. Fundamentals of Electrical Engineering.
2. Basics of Electromagnetism.

Course objective:

1. Introduce basic fundamentals of different electrical machines and transformers.
2. Introduce the characteristics of different D.C. machines
3. Analysis and investigation of the major performance characteristics of different types of motors.
4. Investigation of motors' starting problems.
5. Allow the students to gain the proficiency to differentiate between the different types of motors, with the capability to select the proper motor for the proper application.
6. Provide the students with the proficiency to conduct and benefit from the testing procedures of electric motors with the ability to analyse data and to obtain the major characteristics.

Course outcome:

Upon successful completion of this course, a student should be able to:

1. Design and conduct experiments as well as analyse the parameter of DC machine & transformer.
2. Develop understanding of professional & ethical responsibility of DC machine & transformer.
3. Find out specific rating of Transformer & DC machines for installation as per requirement.
4. Analysis of different operating parameters under load and no load condition.
5. Detection and diagnosis of fault.
6. Get information about proper application of machines.

Syllabus:

Unit 1: Single Phase Transformer (8 Hours)

Transformer construction and practical consideration, Transformer reactance's and equivalent circuits, Engineering aspects of transformer analysis, effect of load on power factor, phasor diagrams, per unit quantities, Excitation phenomenon in transformers-Switching transients, Testing-Polarity test, Open Circuit Test (O.C.) Short Circuit Test (S.C.), Sumpner's Test, Variable frequency transformer, Instrument Transformer-Current transformer, Potential transformer, Pulse transformer and applications.

Unit 2: Three Phase Transformers (6 Hours)

Special constructional features, three phase transformers connections, Labelling of transformers Terminals, Star/Star connection, Delta/Delta Connection, Star/Delta, Delta/Star connection, Delta/Zigzag Star, Star/Zigzag Star, Phase groups, Choice of transformers connections, Harmonics, Parallel operation of transformers, Three winding transformers and its equivalent circuits, Stabilization by Tertiary winding, Phase conversion/Open Delta connection, Three/Two phase conversion (Scott connection), Three/Six conversion, Three/One conversion, On-Off Load Tap changing transformers, cooling methodology, Types and Routing tests according to ISI.

Unit 3: Electromechanical Energy Conversion Principles (6 Hours)

Forces and torques in magnetic field systems Energy balance, Energy in Singly-Excited magnetic field systems, Determination of magnetic force and torque from energy, Determination of magnetic force and torque from co-energy, Multiply-Excited magnetic field systems, Forces and torques in systems with permanent magnets, Energy Conversion via electrical field, Electric field energy, Dynamic equations of electromechanical systems and Analytical Techniques.

Unit 4: DC Generators (8 Hours)

Construction of armature and field systems, Basic Principle of working, Emf equation, Types, armature windings, Characteristics and applications of different types of DC Generators, Building of emf in DC Shunt Generator and causes of failure, Armature reaction-Demagnetizing and Cross magnetizing mmf's and their estimations; Remedies to overcome the armature reaction; Commutation Process, Straight line commutation, Commutation with variable current density, under and over commutation, Causes of bad commutation and remedies; inter-poles, Compensating windings.

Unit 5: D.C. Motors (6 Hours)

Principles of working, Significance of Back emf, Torque Equation, Types, methods of excitation-Steady State Motor Circuit equation, Characteristics and Selection of DC Motors for various applications, Starting of DC Motors, Speed Control of DC Shunt and Series Motors, Braking of DC Motors- Plugging, Dynamic Braking, Regenerative Braking; Losses and Efficiency, Condition for Maximum Efficiency, Effect of saturation and armature reaction on losses; Permanent Magnet DC Motors, Types and Routing tests according to ISI Specifications.

Unit 6: Variable-Reluctance Machines and Stepping Motors (6 Hours)
Basic VRM Analysis, Practical VRM analysis, Current waveform for torque production, Non-Linear Analysis, Stepping Motors.

Text/Reference Books :

1. B.L.Theraja, A.K. Theraja, A Textbook of Electrical Technology, Vol-II, S.Chand& Co., New Delhi,2005.
2. I J Nagrath, D P Kothari; "Electric Machines," Tata McGraw Hill Publication. Second Edition (Reprint) 2003.
3. A.E.Fitzgerald, C.Kingsley, S.D.Umans. "Electrical Machinery" Tata McGraw Hill.Sixth Edition2002.
4. Nasser Syed.A "Electrical Machines and Transformers," New York, Macmillon 1984.
5. Langsdorf "DC Machines".
6. J. B. Gupta, "Electrical Machines", SK Kataria and Sons, New Delhi
7.SK Bhattacharya, "Electrical Machines", Tata McGraw Hill, New Delhi.

Term work:

It will consist of a record of at least eight of the following experiments based on the prescribed syllabus.
1. To perform open circuit and short circuit test on single phase transformer to find its core loss, full load copper loss and constants of its equivalent circuit.
2. To operate two single-phase transformers in parallel and how they share a load under various conditions of their voltage ratios and leakage impedances.
3. To study V-connection of identical single-phase transformers for obtaining three phase transformation.
4. To study Scott-connection of single-phase transformer.
5. Performance of Sumpner's Test.
6. Study of no load current waveform of single-phase transformer.
7. Determination of magnetization, external and internal characteristics of a D.C. shunt generator,
8. Speed variation of a D.C. Shunt machine by- (i) armature voltage control & (ii) field current control method.
9. To study the performances of a D.C. shunt motor by Load/ Brake test.
10. To find efficiency of a D.C. shunt / compound machine by performing Swinburn's test.
11. To separate the losses in a D.C. shunt machines by performing the Retardation test.
12. Field test on two identical series machines to separate various losses and determine the efficiency of machines.
13. Performance of Hopkinson's Test.
14. Study of traditional and modern starters for DC motors

Practical Examination:

The examination will be of three hours duration and will consist of an experiment based on term-work and followed by an oral based on above syllabus.

UEE207 Electrical Measurements and Instrumentation

L	T	P	Credits(Th)	Credits(P)	Total Credits
3	-	2	3	1	4

Prerequisite:

1. Fundamentals of Electrical Engineering.
2. Concept of galvanometer, Wheatstone bridge.

Course objectives:

1. To expose the students to a broad knowledge of experimental methods and measurement techniques.
2. To train the students in the skill of operation of instruments in the electrical & electronic engineering applications.
3. To understand the basic working of instruments used for measurement.
4. To understand the errors in measurements and their rectification.
5. To gain proficiency in the use of common measuring instruments.
6. To compare theoretical predictions with experimental results and to resolve any apparent differences.

Course outcome:

On completion of this course, students should be able to:

1. Study of operating principles of common electrical and electronic measuring instruments, devices and circuits, and their application to testing;
2. Measure the performance of equipment and circuits;
3. Identify and classify error sources, and explain how their effects can be minimized in particular measurement situations;
4. Analyse test measurements and circuit performance mathematically in both time and frequency domains;
5. Specify details of instrumentation and devices intended for a particular application;

Syllabus:

Unit 1: Electrical measurement & Measuring Instrument (6 Hours)

Definition of measurement, classification of instruments. PMMC, moving iron, dynamometer & Induction type instruments. Ammeter, voltmeter, wattmeter and energy meter.

Unit 2: Measurement of resistance, Inductance & capacitance (6 Hours)

Measurement of low, medium and high resistance, insulation resistance, earth resistance. D.C.potentiometer, Kelvin double bridge, bridge megger. A.C bridges for measurement of inductance &capacitance.

Unit 3: Instrument transformers & special measuring instruments (8 Hours)
Instrument Transformers: Current Transformers, Potential Transformers, ratio & phase angle errors,design considerations & testing. Special Measuring Instruments: Single & Three-phase P.f. Meter, Frequency Meters, Synchroscope, Tri-vector Meter, Maximum Demand Indicator, Permeability meter,Q meter, Flux meter.

Unit 4: Electronic Measurements (6 Hours)
Average, peak and true rms response instruments, Hall effect instruments, Electronic voltmeter, multimeter, wattmeter & energy meter. Storage Oscilloscope & its applications. Spectrum & Wave analyser, Digital Counter, Harmonic & Distortion Analyzer, Logic Analyzer.

Unit 5: Introduction to Instrumentation (6 Hours)
Definition of instrumentation, purpose of instrumentation, Transducers: Definition, classification, selection of transducers, resistive transducers. Potentiometers, frequency counters and displays.

Unit 6: Measurements of Non-electrical quantities (8 Hours)
Force measurement using strain gauges, displacement measurements using LVDT, temperature measurement using RTD, thermistor, thermocouple, bellows, and diaphragm. Flow measurement using rotameter, electromagnetic flow meter. Speed measurement using magnetic pick-up &photoelectric pick-up.

Text/Reference Books:

1. A.K. Sawhney, "A course in Electrical & Electronic Measurements &Instrumentation", Publication-DhanpatRai& Sons, Edition 1995.
2. E.W Golding; "Electric Measurement & Measuring Instruments", Publication - A. H. Wheeler & Co, Allahabad, Edition 1983.
3. Helfrick and cooper, "Modern Electronic Instrumentation & Measurement Techniques", Publisher- Pearson, Edition 2007.
4. M. A. Baldwin, "Fundamentals of Electrical Measurements", Publication - Lyall Book Depot, Ludhiyana, Edition 1985.
5. M.U. Reissland, "Electrical Measurements", Publication - Wiely Eastern Ltd, New Delhi, Edition1992.
6. V. Popov; "Electrical Measurements" Publication – Mir, Moscow, Edition 1970.
7. Jones B.E.; "Instrumentation Measurement & Feedback", Publication – Tata McGraw Hill, NewDelhi, Edition 1978.

Term work:

Term work shall consist of at least six to eight practical'sbased on above syllabus. Some of the experiments may be from the following list.

1. Measurement of resistance (high, medium, low)
2. Measurement of inductance.
3. Measurement of capacitance.
4. Phase and frequency measurement on CRO using Lissajous pattern.

5. Study of digital voltmeter, digital multimeter.
6. Study of recorders.
7. Digital measurement of phase and frequency.
8. Study of AC and DC meters.
9. Measuring current and voltage.

Practical Examination:

The examination will be of three hours duration and will consist of an experiment based on term-work and followed by an oral based on above syllabus.

UEE209 Numerical Methods using MATLAB

L	T	P	Credits(Th)	Credits(P)	Total Credits
2	-	2	2	1	3

Prerequisite:

1. Basic Knowledge of Engineering Mathematics.
2. Knowledge regarding Calculus.

Course objectives:

The following aspects are to be considered while dealing with topic from Numerical Methods.

1. Study of various methods of numerical analysis of linear and non-linear problems
2. Use of method for solving the problems in engineering
3. Developing algorithm, flow-chart and computer program in any language

Course outcomes :

After completing this course student will be able to:

1. Solve various methods of numerical analysis of linear and non-linear problems in MATLAB by writing program.
2. Develop algorithm, flow chart and computer program for solution of linear and non linear problems

Syllabus:

Unit 1:Computer Arithmetic: (3 Hours)
Floating Point representation, Arithmetic operations with normalized floating point numbers, errors innumbers, Truncation error, round off error, inherent error, absolute and relative error.

Unit 2: Solution of Non-linear equations: (6 Hours)
Bisection method, false position method, Newton-Raphson method, Method of successiveapproximation, rate of convergence.

Unit 3: Interpolation: (4 Hours)
Lagrange's interpolation, difference table, Newton's Interpolation, iterated linear interpolationtechnique.

Unit 4: Solution of simultaneous algebraic equations: (4 Hours)
Gauss elimination method, Iterative methods and their convergence.Ill-condition equation.

Unit 5: Numerical Integration And Solution of Solution of Ordinary differential equation (7 Hours)

Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Romberg integration, Newton's cote's integration formula, error in these formulae. Taylor series method, Picard's method, Euler method, Runge-Kutta method second and fourth order, predictor corrector method.

Unit 6: Numerical solution of partial differential equation And Least square approximation of functions: (6 Hours)

Finite difference, approximation to derivatives. Laplace equation, Iterative methods for the solution of equations. Linear regression, Polynomial regression, fitting exponential and trigonometric functions.

Text/Reference Books:

1. V. Rajaraman - Computer Oriented Numerical Method- Prentice Hall of India.
2. S.S. Shastry- Introductory methods of numerical analysis., Prentice Hall of India
3. Thomas Richard Mecalla- Introduction to numerical Methods and FORTRAN programming- Willey International Edition.
4. Steven C. Chapra and Raymond P. Canale, Numerical methods for Engineers, Mc-Graw-Hill Publication,2007.
5. B.S. Grewal- Numerical Methods in Engineering & Science, Khanna Publishers.
6. Steve Otto and James P. Denier - An Introduction to Programming and Numerical Methods in MATLAB- Springer
7. Rudra Pratap - Getting Started With Matlab 7 - Oxford University publications

Term work:

Practical examination shall be of 3 hours duration. The students have to write an algorithm, flow chart for theproblem given by an examiner. He should develop program and execute it on the computer system and get itsprintout and face the oral based on above syllabus.

List of Experiments:

1. Introduction to MATLAB
2. Solution of Non-linear equations using Bi-section methods in MATLAB
3. Solution of Non-linear equations using False position methods in MATLAB
4. Solution of Non-linear equations using Newton-Raphson method in MATLAB
5. Solution of Non-linear equations using Iteration Method in MATLAB
6. Study of Newton Forward Interpolation method in MATLAB
7. Solution of simultaneous algebraic equations using Gauss Elimination method in MATLAB
8. Solution of simultaneous algebraic equations using Gauss Seidal method in MATLAB
9. Numerical Integration using Trapezoidal rule in MATLAB
10. Numerical Integration using Simpson's 1/3 Rule in MATLAB

UHS222 Professional Communication

L	T	P	Credits(Th)	Credits(P)	Total Credits
2	-	2	2	1	3

Objectives of the course:

1. To enable students to speak and write English with a good level of proficiency
2. To build confidence in students to face interview, deliver speech, make presentation and participate in meeting and discussion
3. To lay a strong foundation on the subject by revising and correcting the basics .

Syllabus:

Unit 1: Functional Grammar **(10 Hours)**

Building of a sentence and its components, Tense- the time sense: Present, Past and Future tense with uses and applications, Verbs, Noun, Pronoun, Adjective, Adverb, Prepositions and Conjunctions: classification, identifications, uses and applications Active & Passive voice, direct and indirect speech, clause, principles of effective communication.

Unit 2: Listening Skills **(3 Hours)**

Requirements of listening skill, Phonetics and phonology, Articulation of consonants and vowels, Syllables, Weak form stress, Rhythm and intonation, Face to face conversation, Telephonic conversation.

Unit 3: Reading Skills **(2 Hours)**

Requirements of reading skill**,** Reading poetry, Reading prose, Reading article from standard news paper/ magazine

Unit 4: Writing Skill **(5 Hours)**

Paragraph, Resumes, Letters- formal and informal, Circular, Notice, Agendas, Minutes, Reports, E-mail and Blog writing

Unit 5: Speaking Skills **(3 Hours)**

Requirement of speaking skills, Grammatical difficulties, Practice of public speaking, Conversation between /among students or groups on given situations

Unit 6: Integration of skills **(5 Hours)**

Group discussion, Personal interview, Debate and Quiz competition, ppt Presentation,

Practicals and Assignments:

1. Practice of building of sentences and identification of components
2. Practice the uses and applications of tense
3. Identification of parts of speech and form changes- use in sentences
4. Identification of various clauses and their use in sentences
5. **Listening Skills:** Listen few BBC / Voice of America/ NDTV 24*7 or similar standard Television channel / Radio or any standard talk/discussion available in CD/DVD and answer the given questions/ write the summery
6. **Reading Skills:** Read few articles from standard news paper The Hindu/ The Times of India / magazine /books and answer the given questions /write the summery
7. **Writing Skills: (Assignments)**
    a. Write your own CV
    b. Write an E-mail
    c. Write a blog on current topic of discussion
    d. Write a technical report
    e. Write a letter
    f. Comprehension Tests
8. **Speaking and Integration of Skills:**
    a. Converse on few given situations
    b. Group Discussions on a given topic
    c. Debate competition on a given topic
    d. Quiz competition among few groups of students
    e. ppt presentation

Suggested Readings:

1. Essential English Grammar, Raymond Murphy, Cambridge University Press, 1 December, 2007
2. Oxford English Grammar Course: Advanced, Michael Swan and Catherine Walter, Oxford, 24 February, 2012
3. Advanced English Grammar, Martin Hewings, Cambridge University Press, 1 December, 2007
4. *Developing Communication Skills,* **Krishna Mohan** and **Meera Banerjee,** Macmillan India Ltd, New Delhi, 2nd Edition, 2009
5. Oxford Advanced Learner's Dictionary, 8th Edition

OPEN ELECTIVES -

UEE213 Basic Electrical wiring skill

L	T	P	Credits(Th)	Credits(P)	Total Credits
3	-	2	3	1	4

Prerequisite:

1. Basic knowledge of Electrical Engineering.
2. Capability to use accessories like cutter, plier, screwdriver, tester, drill machine etc.

Course objectives:

1. To practice safe working methods on electrical systems
2. Demonstrate and understanding of electrical principles and units
3. Identify a wide range of electrical equipment & devices and understand their principles of operation / connections
4. Understand the principles of earthing / protection and associated protective devices

Course outcomes :

On completion of the course, Students will be able to

1. Demonstrate and understanding of electrical systems, switchgear and circuit types.
2. Diagnose basic faults and recognize their associated symptoms.
3. Access electrical enclosures and replace fuses, reset overloads etc
4. Perform electrical isolation and testing on a wide range of devices and circuits safely.

Syllabus:

Unit I: Electrical systems: (6 Hours)

Laws of electrical circuits, Ohm's and Kirchhoff's laws, single and three phase supply, electricity for safety types of earthing ISI specifications .Safety precaution for electrical installation.

Unit II: Electrical wiring systems: (10 Hours)

Electrical wiring systems in domestic and commercial buildings, conduits, types of wiring, diagram for connection, bus way, bus bars, lighting track and conduits (aluminum , metallic,non-metallic) arrangements. Power handling equipment, switch boards, panel boards, Lighting conductors, purpose, materials, fixing, earthing arrangements.

Unit III : Fundamentals of Illumination and lighting: (12Hours)

Principles of light, electromagnetic radiation, waves, nature of vision, measurements of lighting. Principles of illumination-definitions, visual tasks, factorsaffecting visual tasks, , units of light, definition of flux , solid angle, luminous intensity,utilization factor , depreciation factor, brightness & glare.Electrical light sources : brief description , characteristicsand application of

different types of lamps, method of mounting & lighting control. Luminary'sclassification, lumen method for design – room reflections / glare- manufacturer's data onluminaries/ luminaries cost.

Unit IV: Lighting Design: (12 Hours)

Installation and application in buildings. Artificial light sources, special energy distribution luminous efficiency, color & their application areas and outdoor lighting. Light for offices, schools, libraries, residential, hospitals, parking, outdoors etc. Basic design principles, criteria for planning, sizing, selection & layout of vertical distribution systems (lifts, escalators & moving walk ways) along with mechanical dimensional details.

Text/Reference Books:

1. Uppal. S. L– Electrical Wiring, Estimation & Costing, Khanna Publication (2008).
2. K.B. Raina&S.K. Bhattacharaya – Electrical Design Estimating & Costing, New age international publishers (1991), 1st Edition.
3. Surjeet Singh, "Electrical Estimating and Costing" DhanpatRai and Company (P) Ltd, Reprint 2008.
4. Philips lighting in Architectural Design
5. R.G. HOPKENSON& J. D. Kay. The lighting of Buildings.
6. National Building Code
7. Benjamin Evaus – Daylight in Architecture

Term Work:

Sheets / practical's based on the above curriculum from the following list should be performed. The teacher may add any other experiment or sheets based on above curriculum.

1. Electrical Symbols
2. House wirings
3. Insulators and cables
4. Industrial wiring
5. Hostel wiring
6. Go down wiring
7. Stair Case wiring
8. Hands on connections of extension board

Practical examination shall be of 3 hours duration and it will consist of viva based on practical and theory syllabus.

SEMESTER-IV

UMA202 Engineering Mathematics- IV (Elective I)

L	T	P	Credits(Th)	Credits(P)	Total Credits
4	-	-	4	0	4

UMA202A Complex Analysis:

Course objectives:

To acquaint student with: the basic concepts of complex variables and the function of complex variables. Motivate students to use critical thinking skill to solve practical problems in Engineering and technology.

Syllabus:

Unit-1
Introduction to Complex Variables.
Unit-2
Function of complex variables, limit , continuity , differentiability , Analytic function & its properties, Cauchy-Riemann equation , Harmonic functions, elementary functions.
Unit-3
Line Integral, Cauchy's theorem & Cauchy's Integral formula & its Applications.
Unit-4
Taylors &Laurent's Series expansions.
Unit-5
Residues, Cauchy's Residue Theorem.
Unit-6
Evaluation of Improper Integrals, Conformal mappings.

- Text/Reference Books:
- Function Of Complex Variables Dr.A.R.Shastri
- Advanced Engineering Mathematics – R.K Jain& S.R.K Iyenger
- Advanced Engineering Mathematics- Erwin Kreyszig
- Complex Variables & application R.V Churchill ,JW Brown(seventh edition),Mc Graw Hill(2003)

Course Outcomes: At the end of the course the student is expected to understand:
1.Importance of complex variables in finding roots of algebraic equations.
2. complex function can be described Fluid flow and mechanical problems In two dimensional potential theory.
3. Properties of the Analytic functions in Engineering field.
4. This theory is useful in finding the value of Improper and some real integrals.
5. To Design and study images under conformal transformations.

UMA202B - Statistics and probability:

Course objectives: To acquaint students with: the basic concepts of Statistics and Probability. Theory and its methods so that it will help the students in decision making.

1. **Review of statistics**: Sample data, population dada, measures of central tendencies (mean, mode, median, measures of dispersions, S.D. and variance of sample data and population data), Skewness, Quart sis and moments.
2. **Probability**: basic concepts, fundamental theorem, conditional probability, independent events, Bay's Theorem.

3. **Random variable and probability distribution**: discrete and random variable, probability mass function, its mean variance, cumulative distribution function, Binomial, Poisson distributions, Geometric distribution, negative Binomial distribution.

4. **Continuous random Variable:** probability density function, mean and variance, moments, uniform continuous random variable, normal continuous random variable, standard normal random variable.

5. **Joint probability Distribution**: Probability mass function of discrete random variables X, Y. marginal distribution of X , Y. probability density function of random variables, marginal distribution of random variables X , Y. Conditional distribution of discrete/ continuous random variables X, Y.

Course Outcomes: At the end of the course the students is expected to understand:

Basic concepts of Statistics and Probability & its importance in engineering. By acquiring the Knowledge of these theories, the students are well equipped with the tools of statistics and probabilities. They can apply these techniques to solve the Engineering problems.

Reference boobs:

1. Prem S. Mann , "Introduction of statistics".
2. Erwin Kreyzig , " Advanced engineering mathematics".
3. Ronald E. walpole, et-al "Probability and statistics".
4. William W. Hines, Douglas c. Montgomery, David M. Goldman, Connie m. Borror.

" Probability and statistics in engineering".

UMA202C -Discrete mathematics:

Course objectives: To introduce a number of Discrete Mathematical Structures (DMS) found to be serving as tools even today in the development of theoretical computer science. Course focuses on of how Discrete Structures actually help computer engineers to solve problems occurred in the development of programming languages.

1. **Set and propositions**: Introduction, combinations of sets, finite, infinite and uncountable infinite sets, mathematical induction, principle of inclusion and exclusion, multi sets.

2. **Relation and Function**: Introduction, properties of binary relations, equivalence relation and partition, partial ordering relations and lattics. job scheduling problems, functions. pigeon hole principle.

3. **Graph and Planer Graph** : Basic terminology, multi-graph and weighted graphs, path and circuits , short path in weighted graphs. Eulerian path and circuits, Hamiltonian path and circuits. Factor's of a graph, planer graph.

4. **Trees and Cut-** : Trees, rooted trees, path lengths in rooted trees, pre-fixed codes, binary search trees, spanning trees and cut sets, minimum spanning trees. Transport net-work.

5. **Discrete numeric functions and generating function**: Introduction, manipulation of numeric functions, Asymtotic-behaviour of numeric functions, generating function.

6. **Recurrence Relations and Recursive Algorithms**: Introduction, recurrence relations, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions, total solution. Solution by the method of generating functions.

7. **Boolean Algebra:** lattices and Algebraic systems, principle of duality, basic properties of algebraic system defined by lattices, Boolean lattices and Boolean algebra.

Course Out comes A complete knowledge on various discrete structures available in literature. Realization of some satisfaction of having learnt that discrete structures are indeed useful in computer science and engineering. Gaining of some confidence on how to deal with problems which may arrive in computer science and engineering in near future.

Reference books:

1. C.L. Liu, " Elements of Discret Mathematics". 2. Kennet H. Rosen, " Discrete Mathematics

3. Erwin Kreyzig , " Advanced engineering mathematics". 4. J. K. Truss, " Discrete mathematics for computer Scientists".

UMA202D -Transforms and Z- transform:

Course objectives: To acquaint students with : the basic concepts of Laplace transforms, Fourier Transforms, Linear Difference Equations and Z- transforms. To motivate the students to use critical thinking to solve the practical problems.

Laplace transformation: Introduction, basic properties of Laplace transforms, Laplace Transform of derivatives, Laplace Transform Solution of Initial value problems , Laplace transforms of integrals, differentiation of Laplace Transform, Integration of Laplace transform, Convolution Theorem. Unit step function, second shifting theorem, Laplace Transform of Dirac-delta function and Laplace transform of periodic functions.

Fourier Integral, Fourier Transforms and Integral transforms: Fourier Integral Theorem, Fourier transform, Convolution, Finite Fourier Sine and Cosine Transforms, Parseval's Identity for Fourier Transforms. solution of partial differential equations using Fourier transform.

Linear Difference Equations and Z- transforms: Introduction, Z-Transforms, standard Z-transforms. properties of Z- transform, Inverse Z-transform, Convolution theorem. Solution of difference equations.

Course outcome : At the end of the course the students is expected to understand and to solve 1. Initial value problems by Laplace transform method. 2. partial differential equation by Fourier Transform method. 3. Difference equations by Z- Transform method.

Reference books:

1. R.K.Jain , S.R.K.Iyengar, "advanced engineering mathematics".
2. Erwin Kreyszig , " advanced engineering mathematics".
3. W.E. Boyace, R. Diprima "Elementary Differential Equation"
4. B. V. Ramana " Higher Engineering Mathematics".
5. Koneru S. Rao, " Engineering Mathematics".

UEE204Electrical Machines- II

L	T	P	Credits(Th)	Credits(P)	Total Credits
4	-	2	4	1	5

Prerequisite:

1.Fundamentals of Electrical Engineering.

2. Basics of Electromagnetism.

Course objectives:

1. To introduce fundamentals, physical concepts, and operating principles of AC machinesand special machines.
2. This course aims at building a strong foundation of student in synchronous machines and induction motors with their advantages and disadvantages.
3. To help students in understanding performances of machines under different operating conditions and their testing methodology.
4. To teach students different speed control methods of AC machines.

Course outcome:

Upon successful completion of this course, a student should be able to:

1. Implement various testing methods to detect fault.
2. Work out in research and development related to AC machines.
3. Save power by improving efficiency and voltage regulation.
4. Implement erection and commissioning of AC & special purpose machines according to application.

Syllabus:

Unit 1: Synchronous Generators or Alternators (6 Hours)

Classification of A.C. Machines, Ferraris Principle, Production of 2- phase and 3-phase rotating magnetic fields, principle of operation and constructional (salient and non-salient pole) features of synchronous generators. Production of sinusoidal alternating EMF and its frequency, armature winding, winding factor, EMF equation. Harmonics in voltage waveform, leakage reactance, armature reaction. Short circuit ratio, synchronous reactance, synchronous impedance, determination of voltage regulation (by Potier, EMF, MMF methods), power developed by synchronous generators, phasor diagrams, transient conditions, losses and efficiency.

Unit 2:ParallelOperation of Alternators (6 Hours)

Conditions for parallel operation, Load sharing between two alternators in parallel, Parallel-Generator theorem Process of synchronizing an alternator with infinite bus-bars by lamp methods & by use of synchroscope, Synchronizing torque, power and current.

Unit 3: Synchronous Motors (8 Hours)

Construction & principle of operation, various methods of starting, phenomenon of hunting or phase – swinging – its remedies .Operation of 3-phase Synchronous motor with constant excitation & variable load. Significance of torque angle, load characteristics Phasor diagram on the basis of synchronous impedance. Power flow chart, losses, Operation of 3-phase synchronous motor with a constant mechanical load on its shaft & variable excitation. 'V' Curves &'Inverted V' (pf) curves. Merits and demerits of synchronous motors & its application.

Unit 4: Three Phase Induction Motors (8 Hours)

Construction & principle of operation, types of I.M, slip, frequency of rotor current, rotor EMF, current, pf and torque. Phasor diagrams, different torque equations and relation between them. Torque-Slip, current-speed and Torque- Speed Characteristics, Losses and efficiency. Circle diagrams, starters. I.M tests, cogging and crawling, speed control, deep bar/ double cage rotor, induction generator. Applications, advantages and disadvantages of I.M.

Unit 5: Single Phase Induction Motors (6 Hours)

Introduction, single phase induction motors, double revolving field theory, circuit model of single phase induction motor, determination of circuit parameters and types of single phase I.M. Torque-slip characteristics & applications. Comparison of 1-phase induction motor with 3-phase induction motor.

Unit 6: Special Purpose Motors (6 Hours)

Construction, principle of working, characteristics, ratings & applications of Brushless DC motors, Permanent Magnet motor, linear induction motors, AC series motors, universal motors, repulsion type motors, Schrage motor, servo motors, hysteresis motor.

Text/Reference Books:

1. I J Nagrath, D P Kothari; "Electric Machines," Tata McGraw Hill Publication. SecondEdition (Reprint) 2003.
2. A.E.Fitzgerald, C.Kingsley, S.D.Umans. "Electrical Machinery" Tata McGraw Hill.Sixth Edition 2002.
3. B.L.Theraja, A.K. Theraja, A Textbook of Electrical Technology, Vol-II, S.Chand&Co.New Delhi,2005.
4. Say.M.G - Performance & Design of Alternating Current Machine.(English LanguageBook Society), CBS Publisher (2002).
5. Ashfaq Hussein - Electrical Machines, DhanpatRai Publication (2012).
6. Bhimbra.P.S – Electrical Machines), Khanna Publication (2011).
7. J.B. Gupta – Electrical Machines, SK Kataria& Sons Publication (2010).

Term work:

It will consist of a record of at least eight experiments from the following list based on the Prescribed syllabus.

1. O.C. and S.C. test on Alternator: Determination of its regulation by the EMF methodand MMF method.
2. Direct loading test on three phase Alternator.
3. Determination of axis reactance's of salient pole synchronous machine- Slip Test.
4. Zero power factor test on alternator: Regulation by Potier method and A.S.A. method
5. Synchronizing of alternators: Lamp Methods and use of synchroscope.
6. Load test on three phase squirrel cage induction motor.
7. Determination of Squirrel cage induction motor performance from Circle diagram.
8. Load test on three phase Slip ring induction motor.
9. Effect of rotor resistance on starting torque and maximum torque for three phase Slipring induction motor.
10. Load test on single phase induction motor.
11. Operation of induction motor as induction generator.
12. "V" and "inverse V" curves of synchronous motor at no load and constant load.
13. Load test on Synchronous motor at various voltages and frequency.
14. Load test on Induction motor at various voltages and frequency.
15. Study of induction motor starters..

Practical Examination:

The examination will be of three hours duration and will consist of an experimentbased on term-work and followed by an oral based on above syllabus.

UEE206 Power System Engineering

L	T	P	Credits(Th)	Credits(P)	Total Credits
3	-	2	3	1	4

Prerequisite:

1. Knowledge of Basic Electrical Engineering
2. Present scenario of power system

Course objectives:

1. To introduce students to the basic structure and requirements of any electric power supply system
2. To develop knowledge about nature of power systems engineering and the profession
3. To develop an understanding of components in a power system and to understand the basic principles involved in these components.
4. To explore analysis and design principles for the complete power system
5. Able to erect Transmission Lines.

Course Outcomes:

After completing this course student will have-

1. Ability to model and represent power system components
2. Ability to use software development tools to simulate and analyse the system
3. Ability to implement corrective measure for immediate as well as long term solution to the system problems
4. Get the knowledge of Generation, Transmission and Distribution of power.

Syllabus:

Unit 1: Fundamentals of Power Systems (6 Hours)

Introduction to modern power system: Generation, Transmission and sub-transmission, Distribution, Loads. Growth of power system in India, present Indian power industry, GRID formation, concept of National GRID.Basic Principles: Power in single phase AC circuits, complex power, power factor correction, the complex power balance, complex power flow.

Unit 2: Electrical Design of Overhead Lines (8 Hours)

Resistance, Inductance: Definition, Inductance due to internal flux of two wire single phase line of composite conductor line, Concept of GMD, Inductance of three phase line with equal & unequal spacing, vertical spacing.

Capacitance: Concept of electric field, Potential difference between two points in space, Effect of earth's surface on electric field, Computation of capacitance of single phase, three phase

transmission lines with & without symmetrical spacing for solid & composite conductors. Concept of GMR and GMD, Skin effect, Proximity Effect, Ferranti effect.

Unit 3: Transmission line modeling and performance (6 Hours)

Performance of Transmission Lines: Classification of lines such as short, medium, long lines Voltages and currents at sending end and receiving end of the lines, effect of load p.f. on regulation and efficiency, Determination of generalized ABCD constants in them, Circle Diagrams, numerical based on this concepts.

Unit 4: Mechanical design of overhead transmission line (8 Hours)

Main components of overhead line, conductor materials, line supports, Insulators: Type of insulators, potential distribution over suspension insulator string, string efficiency, methods of improving string efficiency. Corona: Phenomenon of corona, factors affecting corona, advantages and disadvantages of corona, methods of reducing corona. Sag: Sag in overhead line, calculation of sag, Effects of wind & ice coating on transmission line.

Unit 5: Distribution systems (6 Hours)

Distribution system: Classification of distribution, AC and DC distribution system, overhead versus underground system, connection scheme of distribution system. AC and DC distribution calculations.

Unit6: Underground Cables and Sub-Stations: (6 Hours)

Underground cables: Construction of cables, insulating materials of cables, classification of cables, cables for 3-phase services, Insulation Resistance of Single-Core Cable, capacitance of single core cable, Dielectric Stress in single Core Cable, Grading of cables & Numerical.

Sub-Stations: Clssification of Substations, Comparisons between Outdoor and Indoor Sub-Station, Symbols for equipment in Substation Bus-Bar Arrangements in Substations, Key Diagram of Substations

Text/Reference Books:

1. V.K.Mehta, Rohit Mehta "Principles of POWER SYSTEM", Fourth Edition ,S.Chand Publications,2013.
2. C.L. Wadhwa, "Electrical Power Systems", 6th Edition, New Age International, 2010.
3. D.P.Kothari, I.J.Nagrath, "Power System Engineering" 2nd Edition, McGraw Hill Education(India) Pvt. Ltd, 2008.
4. Stevenson W.D. "Power System Analysis", TMH, 4th Edition 1989.
5. J.B. Gupta, "Electrical Power", SK Kataria&Sons(2012).

Term work:

The laboratory consists of minimum EIGHT experiments from following list.

1. Study of different equipment's used in power station.
2. Study of transmission line inductance.
3. Study of transmission line capacitance.
4. Study of different components of power system. (e.g. different types of line conductors,insulators, pole structure)

5. Study of regulation and transmission efficiency for short, medium and long transmission lines.
6. Study of ABCD parameters of short, medium and long transmission lines.
7. Study of circle diagram of transmission lines.
8. Study of corona effect for transmission lines.
9. Study of different effects of power system. (e.g. skin effect, Ferranti effect, proximity effect, surgeimpedance loading)
10. Study of different types of substations.

Independent Learning Experiences:

Online NPTEL video lectures:

- Prof. A.K.Sinha, Department of Electrical Engineering, IIT Kharagpur.

Note:

The computational work is to be carried preferably by using software tools like **MATLAB, Mi-Power, Scilab.**

Practical Examination:

The examination will be of three hours duration and will consist of an experiment based on term-work and followed by an oral based on above syllabus.

UEE208 Network Analysis

L	T	P	Credits(Th)	Credits(P)	Total Credits
3	-	2	3	1	4

Prerequisite:

1. Knowledge of Basic Electrical Engineering
2. Knowledge of Complex Number
3. Knowledge of Matrices.

Course objectives:

1. Study basic fundamentals, theorems used in circuit's analysis.
2. To study steady state analysis of different AC circuits, attenuators, filters and coupled circuits

Course outcomes:

1. Student will able to work with basic fundamentals, theorems used in circuit's analysis.
2. Student will able to work with steady state analysis of different AC circuits, attenuators, filters and coupled circuit.

Syllabus

Unit 1:Development of Circuit Concepts (6 Hours)

Charge, Current, Voltage, Energy, and introduction to basic passive circuit parameters, Conventions for Describing Networks: Reference direction for current and voltage, active element convention, source transformation, dot convention for coupled circuits, Topological description of networks.

Unit 2:Network Equations (6 Hours)

Kirchhoff's laws, number of network equations, loop variable analysis, node variable analysis, duality, formation of network equation in matrix form, network solution by Laplace Transformation technique.

Unit 3:Initial Conditions in Networks& Transform (8 Hours)

Use and study of initial conditions in various elements, procedure for evaluating initial conditions. Transform of Other Signal Waveform: The shifted unit step function, ramp and impulse function, waveform synthesis, initial and final valve theorem, convolution integral, convolution as a summation, sinusoidal steady-state, the sinusoid and solution using $e^{\pm j\omega t}$, phasors and phasor diagrams

Unit 4:Impedance Functions and Network Theorems (8 Hours)

The concept of complex frequency, transform impedance and transform circuits, series and parallel combination of elements, Thevenin's, Superposition, Millman's, Tellegen's, Reciprocity, Norton and Maximum power transfer theorems.

Unit 5:Network Functions **(6 Hours)**

Network functions for one port and two-port network, calculation of network functions, Ladder networks, General networks. Poles and zeros of network functions, restriction on poles and zeros locations for driving point functions and transfer functions, Time domain behavior from pole and zero plot.

Unit 6:Two-Port Parameters **(6 Hours)**

Relationship of two port variables, short circuit admittance parameters, opens circuit impedance Parameters, transmission parameters, hybrid parameters, relationship between parameters sets, parallel connection of two port networks.

Term Work:

Term work shall consist of minimum eight experiments from the list given below

1. Verification of Maximum power transfer theorem.
2. Verification of Thevenin theorem.
3. Verification of Superposition theorem.
4. Plotting of behavior of RC circuit for step input.
5. Plotting of behavior of RL circuit for step input.
6. Plotting of behavior of RLC circuit for step input.
7. Determination of hybrid and impedance parameters of a given network.
8. Sinusoidal study of RC and RL series networks.

Practical Examination:

Practical examination shall consist of performance of the experiment carried out at the time of examination and viva- voce based on the term work submitted by the student for the subject.

Reference Books:

1. M. E. Van Valkenberg, Networtk analysis, Third Edition, Prentice Hall of India Publication, 1996.
2. C. P. Kuriakose, Circuit Theory: Continuous and Discrete Time Systems, Elements of Network Synthesis, Prentice Hall of India Publication, New Delhi, 2005.
3. L. P. Huelsman, Basic Circuit Theory, Third Edition, Prentice Hall of India, New Delhi, 2002.
4. W. H. Hayt. Jr. and J. E. Kemmerly, Engineering Circuit Analysis, Fifth Edition, Tata-McGraw HillEdition, 2000.

UEE210 Signals and System

L	T	P	Credits(Th)	Credits(P)	Total Credits
3	1	-	4	0	4

Prerequisite:

1. Students will required to do arithmetic operation
2. Basic Knowledge derivative, integration, mathematics.
3. Knowledge of Trigonometry.

Course objectives:

The course is designed to provide the fundamental concepts in signals and systems. The course objectives are listed below:

1. To obtain solid foundation in fundamentals of signals and systems,
2. To gain an understanding of some of the very important and basic applications of these fundamentals to problems in filtering, sampling, communications and feedback systems analysis,
3. To develop some appreciation for an extremely powerful and broadly applicable approach to formulating and solving complex problems.

Course outcome:

By the end of the course, students should be able to

1. Know what different types of signals there are,
2. Represent signals in different ways, and know main properties of signals useful to simplify their analysis,
3. Determine systems characteristics: homogeneity, time-invariance, linearity and superposition, stability, etc. and know how to classify systems according to their properties,
4. Obtain a system response to standard signals (impulse response, step response) and then the system response to any signal in terms of those,
5. Represent systems in the time domain and the frequency domain and know how to pass from one representation to another,
6. Analyze the system using Laplace transform, Z-transform, Fourier series representation and Fourier transform
7. Find transfer function (continuous and discrete-time systems) frequency response(continuous and discrete-time systems) of the systems

Syllabus:

Unit 1:Continuous–Time and Discrete –Time Signals and Systems:
Various classifications, Mathematical Representation, Signal Energy and Power, Transformations of the Independent Variable; Periodic Signals; Even and Odd Signals; Arithmetic Operations on Sequences; Continuous-Time and Discrete-Time Complex Exponential. The continuous-Time Unit Step and Unit Impulse Functions. The Discrete-Time Unit Impulse and Unit Step Sequences; Representation of Direct-Time Signals in Terms of impulse. Continuous-Time and Discrete-Time Systems Interconnections of Systems; Basic System Properties (Causality, Stability, Time-Invariance, Linearity, Invertibility, systems with and without, memory).

Unit 2:Linear Time –invariant systems:
The Discrete–Time and Continuous-Time LTI Systems; Unit Impulse Response; Convolution Sum and Convolution Integral Representation. Properties of LTI Systems (Commutative, Distributive, Associative Properties, Invertibility, Causality, Stability).The Unit Step Response of an LTI System; LTI Systems Described by Differential and the Difference Equations; Block Diagram Representations, Singularity Functions.

Unit 3:Fourier Series Representation of Periodic Signals:
The Response of LTI Systems to Complex Exponential; Fourier Series Representation of Continuous-Time and Discrete–Time periodic Signals; Convergence of the Fourier Series; Properties of Discrete-Time and Continuous-Time Fourier Series; Fourier Series and LTI Systems.

Unit 4:Continuous-Time Fourier Transform and DTFT
Representation of Continuous-Time Aperiodic Signals and Continuous-Time Fourier Transform; the Fourier Transform for Periodic Signals, Properties of Continuous-Time Fourier Transform; Fourier Transform and LTI Systems.
Representation of Discrete-Time Aperiodic signals and the Discrete-Time Fourier Transform; Fourier Transform for Periodic Signals; Properties of the Discrete-Time Fourier Transform; Discrete-Time LTI Systems and Discrete-Time Fourier Transform.
Sampling:
Representation of a continuous–Time Signal by its Samples; The Sampling Theorem; Reconstruction of Signals form its Samples using Interpolation; Effect of Under Sampling (Frequency Domain Aliasing); Discrete Tim processing of Continuous–Time Signals.

Unit 5:Laplace Transform:
The Laplace Transform; Region of Convergence for Laplace Transform; Properties of Laplace Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties ofLaplace Transform; Analysis and Characterization of LTI Systems using the Laplace Transform;System Transfer Function; Block Diagram Representations; The Unilateral Laplace Transform;Solution of Differential Equations using the Unilateral Laplace Transform.

Unit 6: Z Transform:

The Z Transform; The Region of Convergence for the Z- Transform; Geometric Evaluation of theFourier Transform from the Pole-Zero Plot; Properties of Z-Transform; Analysis and Characterizationof Discrete-Time LTI Systems using Z-Transform; System Transfer Function; Block DiagramRepresentation; The Unilateral Z-Transform; Solution of Difference Equation using the Unilateral ZTransform

Reference Books:

1. A. V. Oppenheim, A. S. Willsky with S. H. Nawab, Signals and Systems, Prentice- Hall of India Private Limited, Second Edition, 1997.
2. S. Haykin and B. V. Veen, Signals and Systems, John Wiley and Sons, Inc., Second Edition, 1999.
3. M. J. Roberts, Signals and Systems: Analysis using , Transform Methods and MATLAB, Tata McGraw-Hill Publishing Company Limited, Second Edition, 2003.

UEE212 CAD Lab

L	T	P	Credits(Th)	Credits(P)	Total Credits
-	-	2	0	1	1

Prerequisite:

1. Minimum knowledge of basic computer programming
2. Introduction to MATLAB.

Course objectives:

1. To study the Simulink toolboxes and special toolboxes.
2. To get introduce with PSPICE software and simulation based on it.

List of Experiments

Minimum ten experiments to be performed from

1. Three MATLAB experiments using Control System Toolbox.
2. Three MATLAB programming experiments using MATLAB m-file.
3. Four MATLAB experiments using Power System Toolbox.
4. Four experiment on circuit analysis using P-spice software.

UHS221 Human Values and Professional Ethics

L	T	P	Credits(Th)	Credits(P)	Total Credits
2	-	-	2	0	2

Objectives of the course:

4. Making the students aware and sensitive to value system in real life situations.
5. To help the students to discriminate between ephemeral and eternal values
6. To discriminate between essence and form

Unit 1: Course Introduction (5 Hours)

Need, Basic Guidelines, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for Value Education.
- A look at basic aspirations: Self Exploration, Happiness and Prosperity
- Fulfillment of human aspirations and harmony

Unit 2: Understanding the Harmony (5 Hours)

- Thoughtful human being harmony, sentient, attitude and its importance in relationship
- Significance of restraint and health *(Yama and Niyama)*
- Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order

Unit 3: Understanding professional Ethics (5Hours)

- Harmony at various levels and understanding professional ethics
- Creating environmentally aware engineers
- Humanistic universal education, natural acceptance of human values, ethical human conduct

Unit 4: Competence of professional ethics (5Hours)

- Management models for present technologies, strategies for integrating humans in family and at all levels of existence
- Relevance of the above strategies in becoming responsible engineers, technologists and managers.

Unit 5: Motivation (2 Hours)

- Contribution of ancestors in science and technology development to raise self esteem in Indian context.

Suggested Readings / Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
5. A.N. Tripathy, 2003, Human Values, New Age International Publishers
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
8. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
9. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
10. Subroto Bagchi, The Professional
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008. Scheme and Syllabus Bachelor of Computer

OPEN ELECTIVE -

UEE216: Basics of Electrical Machines

L	T	P	Credits(Th)	Credits(P)	Total Credits
3	-	2	3	1	4

Prerequisite:

1.Fundamentals of Electrical Engineering.
2. Basics of Electromagnetism.

Course Objectives:

1. Make awareness in students the application of electrical machines in day to day life.
2. To help the students to implement electrical machine knowledge in their respective field.

Course Outcomes:

At the end of the course the student will be able to:

1. Repair minor problems related to electrical machine.
2. Identify the basic difference between AC & DC machines.
3. Understand the application of single phase motors in daily use.
4. To understand the principle of working and construction of the machine.

Syllabus:

Unit 1: Transformers: (08 Hours)

Transformer construction and practical consideration, transformer reactance and equivalent circuits, polarity test, open – circuit(O.C.) and short circuit (S.C.) Test, instrument transformers-current transformer and potential transformer, auto-transformer. Efficiency and all day efficiency of transformer, introduction to 3-Ø transformer.

Unit 2: D.C .Generator: (08 Hours)

Principle, construction and working of D.C. generator, pole cores and pole shoe, Armature core, armature windings, commutator, Lap and wave winding, types of generator, EMF equation of a D.C. Generator, Iron losses in armature, total losses in Generator, condition for maximum efficiency, characteristics of generator.

Unit3: D.C .Motor: (08 Hours)

Principle, comparison of generator and Motor action significance of back emf, voltage equation of a motor, condition for maximum power, torque Armature torque of a motor , shaft torque, speed of d.c .motor speed regulation, motor characteristics, characteristics of shunt motors, compound motors, comparison, speed control of D.C. shunt motor ,types of starter.

Unit 4: Induction Motor: (10 Hours)

General principle, construction, rotor, Rotor rotation, slip, frequency of rotor current, starting torque for squirrel cage motor, condition for maximum starting torque. Relation between torque and slip, effect of changes in supply voltage on torque & speed, full load torque and maximum torque .Equivalent circuits of induction motor, single phase I.M. Revolving Theory, Equivalent circuit of a single-phase motor, Types of single phase motors & special purpose motors.

Unit5: Alternators: (06 Hours)

Basic principles, construction, star and Delta connection, Equation of induced EMF, alternator on load, voltage regulation, parallel operation of two alternators.

Reference Books:

1. B.L.Theraja, A.K. Theraja, A Textbook of Electrical Technology, Vol-II, S.Chand& Co., New Delhi, 2005.
2. I J Nagrath, D P Kothari; "Electric Machines," Tata McGraw Hill Publication. Second Edition (Reprint) 2003.
3. A.E.Fitzgerald, C.Kingsley, S.D.Umans. "Electrical Machinery" Tata McGraw Hill. Sixth Edition 2002.
4. J. B. Gupta, "Electrical Machines", SK Kataria and Sons, New Delhi.
5. Ashfaq Hussein - Electrical Machines, DhanpatRai Publication (2012).
6. Bhimbra.P.S – Electrical Machines), Khanna Publication (2011).

Term work:

It will consist of a record of at least eight of the following experiments based on the prescribed syllabus.

1. To Study and perform open circuit and short circuit test on single phase transformer to find its core loss, full load copper loss and constants of its equivalent circuit.
2. To study Scott-connection of single-phase transformer.
3. To Study and perform Speed variation of a D.C. Shunt machine by- (i) armature voltage control & (ii) field current control method.
4. To Study and perform speed reversal of dc shunt motor.
5. To Study characteristics of dc motor.
6. Study of three point motor starters.
7. Study of induction motor starters.

****