(A)B. Tech. Electrical Engg. & (B) B.Tech. Electrical & Electronics Engg.

Scheme of Studies/ Examination

Common Scheme for both branches (EE& EEE).

Semester III (w.e.f. session 2016-2017, K.U.K.)

S. N.	Course Code	Course Title	Teaching Schedule				Allotment of Marks				Dur. of Exam (Hrs)
			L	T	P	Hrs/Week	Theory	Sessional	Practical	Total	
1	AS-201N	Mathematics-III	3	1		4	75	25		100	3
2	EE-201N	Electronic Devices & Circuits	4	0		4	75	25		100	3
3	EE-203N	Network Analysis & Synthesis	3	1		4	75	25		100	3
4	EE-205N	Electrical Machines- I	4	1		5	75	25		100	3
5	EE-207N	Electrical Power Generation	3	0		3	75	25		100	3
6	EE-209N	Communication Systems	4	0		4	75	25		100	3
7	EE-211N	Electronic Devices & Circuits Lab			2	2		25	25	50	3
8	EE-213N	Electrical Machines -I Lab			2	2		50	50	100	3
9	EE-215N	Communication Systems Lab			2	2		25	25	50	3
10	EE-217N	Electrical Workshop			2	2		50	50	100	3
11	MPC-202N	Energy Study*	3			3	75*	25*		100*	3
		Grand Total	24	3	8	35	450	300	150	900	

* Energy Study is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.

Common Scheme for both branches (EE& EEE).

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Theory	Sessional	Total	
AS-201N	MATHEMATICS-III	3	1	0	75	25	100	3
Purpose	To acquaint the students with the basic use of PDE, Linear Programming problems, Fourier series and transforms, Complex variables and Probability							
Course Outcomes (CO)								
CO-1	This section is concerned mainly with Fourier series. However, the underlying ideas can also be extended to non-periodic phenomena. This leads to Fourier integrals and transforms which are very much useful in solving the initial and boundary value problems.							
CO-2	Students will learn about the formation and solution the partial differential equations. First order PDE of any degree by using Charpit's method will be discussed in details. In addition, how to solve homogeneous linear PDE with constant coefficients and variable separable method and LPP will be covered under this section.							
CO-3	Complex analysis is concerned with generalization of the familiar real functions of calculus and their detailed knowledge is an absolute necessity in practical work to solve engineering problems.							
CO-4	Probability theory provides models of probability distributions(theoretical models of the observable reality involving chance effects) to be tested by statistical methods which has various engineering applications, for instance, in testing materials, control of production processes, robotics, and automatization in general, production planning and so on.							

UNIT-I

Fourier Analysis

Fourier series: Euler's formulae, Orthogonality conditions for the Sine and Cosine function, Dirichlet's conditions, Fourier expansion of functions having points of discontinuity, Change of interval, Odd and even functions, Half-range series.

Fourier Transforms: Fourier integrals, Fourier transforms, Fourier Cosine and Sine transforms, Properties of Fourier transforms, Convolution theorem, Parseval's identity, Fourier transforms of the derivative of a function, Application of transforms to boundary value problems (Heat conduction and vibrating string).

UNIT-II

Partial Differential Equations and LPP

Formation and Solutions of PDE, Lagrange's Linear PDE, First order non-linear PDE, Charpit's method, Homogeneous linear equations with constant coefficients, Method of separation of variables.

Solution of linear programming problems: using Graphical and Simplex methods.

UNIT-III

Theory of Complex Variables

A review of concept of functions of a complex variable, Limit, continuity, differentiability and analyticity of a function. Basic elementary complex functions (exponential functions, trigonometric & Hyperbolic functions, logarithmic functions) Cauchy-Riemann Equations.

Line integral in complex plane, definition of the complex line integral, basic properties, Cauchy's integral theorem, and Cauchy's integral formula, brief of Taylor's, Laurent's and Residue theorems (without proofs).

UNIT-IV

Probability theory:

A review of concepts of probability and random variables: definitions of probability, addition rule, conditional probability, multiplication rule, Conditional Probability, Mean, median, mode and standard deviation, Bayes' Theorem, Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function.

Standard Distributions: Binomial, Poisson and Normal distribution.

References Books:

1. E. Kreyszig : Advanced Engineering Mathematics, Wiley India.
2. B. V. Ramana: Engineering Mathematics, Tata McGraw Hill.
3. R.K. Jain, S.R.K. Iyengar: Advanced Engineering Mathematics, Taylor & Francis.
4. Murray R Spiegel: Schaum's Outline of Complex Variables, McGraw Hill Professional.

Michael D. Greenberg: Advanced Engineering Mathematics, Pearson Education, Prentice Hall.

EE-201N	Electronic Devices & Circuits					
Lecture	**Tutorial**	**Practical**	**Theory**	**Sessional**	**Total**	**Time**
4	0	0	75	25	100	3 Hr.
Course Outcomes						
CO1	Basics of various types of Semiconductor elements, Regulated power supply					
CO2	Model of Low & High frequency transistors, Opto-Electronics Devices					
CO3	Various types of Amplifiers, their frequency response, Power Amplifiers & applications					
CO4	Feedback Amplifiers, noise reduction, various types of Oscillators					

Unit-I

Semiconductors:

Band structure of semiconductor, Electron & hole distribution, current transport in semiconductor & concept about mobility, Diffusion & recombination, continuity equation & its solution, Hall effect. Types of P-N junction diodes: Tunnel, Zener, Shockley, Schottky, Varactor diode, Clipper & clamper ckts. (Structure & Characterstics only).

Regulated Power Supplies:

Series and shunt voltage regulators, power supply parameters, three terminals I.C. regulators, SMPS.

Unit-II

Low & High Frequency Transistors Model:

Transistor hybrid model, h-parameter of equivalent circuit of transistor, Analysis of transistor amplifier using h-parameters in CB, CE & CC.

Basics of Opto-Electronics:

Photo-diodes, photo transistor, P-N Junction solar cells, LED, laser and photovoltaic device.

Unit-III

Amplifiers:

Small signal amplifier and mathematical analysis, RC coupled, transformer coupled, direct coupled amplifier and their frequency response, Wide band amplifier, tuned amplifier,

Power amplifiers:

Class A, class B and class C amplifier, Calculation of efficiency and harmonic distortion, push pull amplifier and application of power amplifier.

Unit-IV

Feed Back amplifiers:

Concept of +ve &-ve feedback, overall gain, advantage of –ve feedback , voltage & current feedback, series and shunt feedback, effect of feedback on frequency response and bandwidth, noise reduction using -ve feedback, effect on I/P & O/P characteristics.

Oscillators:

Barkhausen criteria, Oscillators: Wein Bridge, RC phase shift, Colpitts & Hartley oscillators, Multivibrators using transistor, crystal oscillator.

Paper Setter's Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

REFERENCES:

1. Integrated Electronics; Miliman & Halkias; McGraw Hill.
2. Electronic circuit analysis and design (Second Ed.) D.A.V Neamen: TMH.
3. Electronics Principles: Malvino: McGraw Hill.
4. Electronics Circuits: Donald L. Schilling & Charles Belove, McGraw Hill.
5. Electronics Devices & Circuits: Boylested & Nashelsky, Pearson.

EE-203N	Network Analysis and Synthesis					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	1	0	75	25	100	3 Hr.
Purpose	To familiarize the students with the concepts of topology, transient analysis, network modeling, filters and methods of network analysis and synthesis for solving simple and complex circuits.					
Course Outcomes						
CO1	To understand the concept of N/W topologies and network analysis using graph theory.					
CO2	To understand various parameters of two port networks & their relationship					
CO3	To understand types , classification & design of filters					
CO4	To understand the concept of synthesis of one port network.					

UNIT-I

NETWORK FUNCTIONS & GRAPH THEORY: Terminal pairs or Ports, Network functions for one-port and two-port networks, concept of poles and zeros in Network functions, Restrictions on pole and zero .Locations for driving point functions and transfer functions, Time domain behaviour from the pole-zero plot. Principles of network topology, graph matrices, network analysis using graph theory.

UNIT-II

TWO PORT NETWORKS: Characteristics and Parameters of two port networks**,** Network Configurations**,** short circuit Admittance parameters, open-circuit impedance parameters, Transmission parameters, hybrid parameters, condition for reciprocity & symmetry of two-port networks in different parameters representations. Inter-relationships between parameters of two-port network sets, Expression of input & output impedances in terms of two port parameters, Inter-connection of two port networks, analysis of typical two-port networks, image impedances.

UNIT-III

FILTERS: Types of filters and their characteristics**,** Filter fundamentals, classification of Filters, Analysis & design of prototype high-pass, prototype low-pass, prototype band-pass, and prototype band-reject Filter, m-derived low-pass & high -pass filters, low -pass filter and high-pass filter with RC & RL circuits, Band pass filter with RLC circuit.

UNIT-IV

NETWORK SYNTHESIS: Hurwitz polynomials**,** Properties of Hurwitz polynomials**,** Positive real functions, procedure of testing of PR functions, concept and procedure of network synthesis, properties of expressions of driving point immitances of LC networks. LC Network synthesis: Foster's I & II Form, Cauer's I & II form, RC & RL Network.

Paper Setter's Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

REFERENCES:

1. Network Theory Analysis & Synthesis: Smarajit Ghosh; PHI.
2. Network Analysis & Synthesis: F.F. Kuo; John Wiley & Sons Inc.
3. Circuit Theory, A.Chakarbarti, Dhanpat Rai
4. Introduction to modern Network Synthesis: Van Valkenburg; John Wiley.
5. Network Analysis: Van Valkenburg; PHI.
6. Networks and Systems: D.Roy Choudhury; New Age International.

EE-205N	Electrical Machines-I					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
4	1	0	75	25	100	3 Hr.
Course Outcomes						
CO1	To understand concept ,working, operation, maintenance of single phase transformer					
CO2	To understand concept ,working, operation, maintenance of three phase transformer & conversion from three phase to multiple phases					
CO3	To understand construction ,working, operation of D.C. Generator					
CO4	To understand concept ,working, operation, testing of D.C. Motor					

UNIT – I

TRANSFORMERS: Principle, construction of core, e.m.f. equation, winding & tank, cooling, operation, testing of single phase transformer, equivalent circuit, phasor diagram, parameters determination, P.U representation of parameters, regulation, losses & efficiency, separation of iron losses, parallel operation, all-day efficiency, Sumpner's test, specifications of transformer, maintenance of transformer, difference between power transformer and distribution transformer.

UNIT – II

Three phase transformer: Types and their comparative features, Zig-zag connection.

Auto-Transformer: Principle, construction, comparison with two winding transformers, applications.

Nature of magnetizing current: plotting of magnetizing current from B-H curve, inrush current. **Phase-Conversion:** Three to two phase, three to six phase and three to twelve phase conversions. Introduction to three windings transformer, tap-changing & phase- shifting transformers.

Instrument transformer: Current transformer, Potential transformer.

UNIT – III

D.C. Generator-Principle & construction of D.C. generator, simplex lap, wave winding, E.M.F. equation, types, voltage build up, armature reaction, compensating winding, function of commutator, methods of improving commutation, load characteristics, parallel operation.

Excitation System—Purpose and requirements of excitation system, brushless excitation system.

UNIT- IV

D.C. Motor-Principle of DC motors, function of commutator in DC motors, torque and output power equations, load characteristics, losses, starting, starters, speed control, braking, testing ,Swinburne test, Hopkinson test, Ward Leonard Method, efficiency & applications.

Paper Setter's Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

REFERENCES:

1. Electrical Machines: I.J. Nagrath and D.P. Kothari, TMH, New Dehli.
2. Performance & Design of DC Machines: A.E Clayton & N.N Hancock; ELBS.
3. Electric Machinery, Fitzerald & Kingsley, MGH.
4. Theory of alternating current machinery, A.S Langsdorf, TMH.
5. Electrical Machines, P.S. Bhimbra, Khanna Pub. Delhi.
6. Electrical Machines: Ashfaq Husain, Dhanpat Rai & company

EE-207 N	Electrical Power Generation					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
3	0		75	25	100	3 Hr.

Course Outcomes	
CO1	To study, Load and loading forecasting, Power plant economics, Tariffs and power factor improvement used in power generation
CO2	To understand working of Thermal power plants, Hydro power plants
CO3	(a)To understand working of Nuclear power plants,Diesel power plants (b)Combined working of thermal& hydel plants.
CO4	To make conversant with Non Conventional Energy Sources:

Unit – I

Load and Load Forecasting:

Load curves, maximum demand, load factor, diversity factor, capacity factor, utilization factor, types of load, load forecasting, base load and peak load.

Power Plant Economics:

Choice of type of generation, size of generator and number of units, cost of electrical energy, depreciation of plant, effect of load factor on cost of Electrical Energy.

Tariffs and Power Factor Improvement:

Different types of tariffs and methods of power factor improvement.

Unit-II

Thermal Power Plants:

Choice of site, lay out, fuel-gas flow diagram, water steam flow diagram, working of power plants and their layout, characteristics of turbo generators.

Hydro power plants:

Choice of site, classification of hydro electric plants, main parts and working of plants and their layouts, characteristics of hydro electric generators.

Speed governing—Purpose, hydraulic type governor functioning

Unit-III

Nuclear power plants:

Choice of site, classification of plants, main parts, layout and their working, associated problems.

Diesel Power Plants:

Diesel plant equipments, diesel plant layout and their working, application of diesel plants.

Combined working of plants:

Advantages of combined operation plant requirements of base load and peak load operation. Combined working of run-off river plant and steam plant.

Unit-IV

Introduction to Non-Conventional Energy Sources: Elementery idea of power generation by Wind, Solar, Ocean, and Geothermal sources of energy, fuel cell, biomass.

Paper Setter's Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

REFERENCES:

1.C.L. Wadhwa, —Electric Power Systemǁ (Willey Eastern Ltd).
2.I.J. Nagnath and D.P. Kothari —Power System Engineeringǁ TMGH.
3.Power Genreation by B.R Gupta, S.Chand.
4.Power System Engg. By R.K Rajput, Luxmi Publication.

EE-209N	Communication Systems					
Lecture	Tutorial	Practical	Theory	Sessional	Total	Time
4	0	0	75	25	100	3 Hr.
Course Outcomes						
CO1	Basics of communication & noise generation					
CO2	Amplitude modulation, concept of SSB waves & DSBSC,VSB Modulation					
CO3	Concept of TDM, FDM, PAM and Digital communication					
CO4	Concept of Pulse code modulation, differential pulse code modulation, Digital modulation Techniques					

Unit-I

Introduction to Communication Systems:

The essentials of a communication system, modes and media's of communication, introduction to wired and wireless media, classification of signals and systems, Fourier Analysis of signals.

Introduction to noise:

External noise, internal noise, S/N ratio, noise figure.

Unit-II

Amplitude modulation:

Amplitude modulation , generation of AM waves, Frequency Spectrum, Demodulation of AM waves, DSBSC, generation of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB)

Angle modulation:

Basic definition, Introduction to phase modulation (PM) & frequency modulation (FM) multiplexing,

Unit-III

Pulse Modulation:

Sampling theorem & aliasing. Time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse width modulation (PWM). Pulse Position Modulation (PPM)

Elements of Digital Communication System:

Block diagram of digital communication system, digital representation of analog system, Advantage & disadvantage of digital communication,

Unit-IV

Pulse Digital Modulation:

Elements of pulse code modulation, noise in PCM systems, measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM).

Digital modulation techniques: ASK, FSK, BPSK, QPSK, M-ary PSK.

Paper Setter's Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

REFERENCES :

1. Communication Systems (4th edn.): Simon Haykins, John Willey & sons.
2. Communication Systems: Singh & Sapre, TMH.
3. Electronic Communication Systems: Kennedy, TMH.
4. Communication Electronics: Frenzel, TMH.
5. Communication Systems: Taub & Schilling, TMH

MPC-202 N	ENERGY STUDIES					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**75**	**25**	**100**	**3**
Purpose	To make the students conversant with the basics concepts and conversion of various form of Energy					
Course Outcomes						
CO1	An overview about Energy , Energy Management, Audit and tariffs					
CO2	Understand the Layout and working of Conventional Power Plants					
CO3	Understand the Layout and working of Non-Conventional Power Plants					
CO4	To understand the role of Energy in Economic development and Energy Scenario in India					

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.

Energy Management: General Principles of Energy Management, Energy Management Strategy.

Energy Audit: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non-Conventional Energy sources: Basic principle, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energy power plant , Bio energy plants ,Geothermal energy plants and tidal energy plants. MHD

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.

References:

1. Energy Studies-Wiley Dream tech India.
2. Non-conventional energy resources- Shobhnath Singh, Pearson.
3. Soni,Gupta,Bhatnagar: Electrical Power Systems – DhanpatRai& Sons
4. NEDCAP: Non Conventional Energy Guide Lines
5. G.D. Roy :Non conventional energy sources
6. B H Khan :Non Conventional energy resources - McGraw Hill
7. Meinel A B and Meinal M P,Addison:Applied Solar Energy- Wesley Publications
7. George Sutton: Direct Energy Conversion -McGraw

EE-211N	Electronic Devices Ckt. Lab					
Lecture	Tutorial	Practical	External	Sessional	Total	Exam Time
		2	25	25	50	3 Hr.

LIST OF EXPERIMENTS:

1. To experimentally draw the reverse breakdown characteristics of Zener diode as a voltage regulator.
2. To draw the input and output characteristics of a given transistor in common emitter configuration.
3. To measure ac ripple factor of half wave rectifier, full wave rectifier & bridge rectifier and effect of different filter circuits at different loads.
4. To measure h- parameters of given transistor in common emitter configuration at 1 KHz.
5. To draw characteristics of photo diode & LED.
6. To draw characteristics of opto-coupler.
7. To draw characteristics of Varactor diode.
8. To determine voltage gain, power gain & freq. response of Transformer coupled amplifier.
9. To study Hartley Oscillator.
10. To study the different types of negative feedback in two stage amplifier and to observe its effects upon the amplifier parameters.

Note: At least ten experiments are to be performed; at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

EE-213N			Electrical Machine-I Lab			
Lecture	Tutorial	Practical	External	Sessional	Total	Exam Time
0	0	2	50	50	100	3 Hr.

LIST OF EXPERIMENTS:

1. To find turns ratio, polarity & mark dot convention of a 1-phase transformer.
2. To perform open & short circuit tests on a 1-phase transformer& find parameters.
3. To perform Sumpner's Back to Back test on 1-phase transformer& find parameters.
4. Parallel operation of two 1-phase transformers and observe load sharing.
5. To convert three phase supply to 2-phase by Scott-connection, compare line currents theoretically& practically for unbalanced load.
6. To perform load test on DC shunt generator & find efficiency & observe speed at different load.
7. Speed control of DC shunt motor by armature & field control method, draw graph between speed & field current.
8. To perform Swinburne's test of DC shunts motor and find efficiency.
9. To perform Hopkinson's test of DC shunts M/Cs.
10. To perform Ward Leonard method for speed control DC shunts motor.
11. To make various types of three phase connections ,using three single phase transformers, study relevant features
12. Characteristics for compound, series shunt generators.

Note: At least ten experiments are to be performed; at least eight experiments should be performed from above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

EE-215 N	Communication Systems lab					
Lecture	Tutorial	Practical	External	Sessional	Total	Exam Time
0	0	2	25	25	50	3 Hr.

LIST OF EXPERIMENTS:

1. To observe sampling theorem waveforms on CRO.
2. To observe AM Modulation/Demodulation waveforms on CRO.
3. To observe FM Modulation / Demodulation on CRO.
4. To observe PAM Modulation / Demodulation waveforms on CRO.
5. To observe Delta Adaptive Modulation / Demodulation waveforms on CRO.
6. To observe PCM Modulation / Demodulation waveforms on CRO.
7. To observe Carrier Modulation technique using ASK on CRO.
8. To observe Carrier Modulation technique using FSK on CRO.
9. To observe Carrier Modulation technique using PSK on CRO.
10. Comparative study of Delta Modulation & Adaptive Delta Modulation Technique on CRO.
11. To observe Time Division Multiplexing & De-multiplexing on CRO.

Note: At least ten experiments are to be performed; at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

EE-217N	Electrical Workshop					
Lecture	Tutorial	Practical	External	Sessional	Total	Exam Time
0	0	2	50	50	100	3 Hr.

LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols, and abbreviations.
2. a) To make connections of stair case wiring.
   b) To carry out house wiring using battens, cleat, casing-capping, and conduit wiring.
3. To make connections of high pressure mercury vapour lamp (H.P.M.V) and Sodium vapour lamp and study the performance.
4. Repairing of home appliances such as heater, electric iron, fans, fluorescent tube light etc.
5. To study construction of moving iron, moving coil, electrodynamics & induction type meters.
6. To design & fabricate single phase transformer.
7. To study fuses, relays, contactors, MCBs, and circuit breakers.
8. Insulation testing of electrical equipments with the help of megger.
9. To design, fabricate a PCB for a circuit, wire-up and test.
10. To study electrical Drawing of a building and prepare drawing of workshop lab.
11. a) To make connections of house hold wiring from main- using color code for phase ,earth, neutral b) Testing of earth wire, earthing and phase wire in house hold wiring.
12. Measurement of frequency, phase angle, voltage with the help CRO and function generator.

Note: At least ten experiments are to be performed; at least eight experiments should be performed from above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.