HOD(EEE)
Principal
26.6.19

Jharkhand University of Technology
Jharkhand, Ranchi

Proposed Syllabus for B.Tech 3rd Semester

Electrical Engineering

&

Electrical and Electronics Engineering

Electrical Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	EE301	Electrical Machine-I	3	1	0	3
02	EE302	Network Theory	3	1	0	3
03	EE303	Electromagnetic Field Theory	3	1	0	3
04	EC301	Basic Electronics	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	EE301P	Electrical Machine-I Lab	0	0	3	1
02	EE302P	Network Theory Lab	0	0	3	1
03	EC301P	Basic Electronics Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
		Total credit				**21**

Electrical and Electronics Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	EE301	Electrical Machine-I	3	1	0	3
02	EE302	Network Theory	3	1	0	3
03	EE303	Electromagnetic Field Theory	3	1	0	3
04	EC301	Basic Electronics	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	EC301P	Basic Electronics Lab	0	0	3	1
02	EE301P	Electrical Machine-I Lab	0	0	3	1
03	EE302P	Network Theory Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
		Total credit				**21**

Mathematics III

(COMMON FOR ALL BRANCH)

Course code –BSC- 301

L	T	P	CR.
3	1	0	4

Module I

Laplace Transformation: Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

Module II

Fourier Transform: Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine,cosine Transformation, Inverse Transformations -simple illustration.

Module III

Z-Transform: Inverse Z-Transform- Properties – Initial and final value theorems-convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

Module IV

Partial Differential Equations: Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

Module V

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula , Inverse Interpolation by Lagrange's formula , Numerical Differentiation and Numerical Integration : Trapezoidal rule , Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule ,Weddle quadrature formula.

Text Books

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition.

Reference Books

- R. J. Beerends ,H. G. Ter Morsche ,J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI.

BASIC ELECTRONICS

(ECE, EEE, EE,CSE, IT)
Course code -EC 301

L	T	P	CR.
3	1	0	3

Module I: Basic Electronic Components

Active and Passive Components, Types of resistors and Colour coding, Capacitors, Inductors applications of Resistor, Capacitor and Inductor, Relay, LDR, Basic Integrated Circuits (IC 7805, 7809, 7812, 555 etc.).Measuring Instruments like CRO, Power supply, Multi-meters etc.

Module II: Semiconductors

Difference between Insulators, Semiconductors and Conductors, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Fermi Level, Energy band, Charge Densities in Semiconductors, Mass Action Law, Current Components in Semiconductors, Drift and Diffusion Current, The Continuity Equation, Injected Minority Charge Carrier, Hall Effect, P-N Junction Diode, construction, working, characteristics and diode equation Application of Diode, Rectifier: Half Wave, Full Wave and Bridge Rectifier, Zener Diode and its Applications, Varactor Diode, Schottky Diode, Regulated Power Supply using Zener Diode and Regulated ICs, LED, Photodetector.

Module III: Transistors

Construction, Working, Modes and Configuration of BJT, Input and Output Characteristics of all Configurations, Comparison of all Configuration & Modes, BJT as a Switch and as an Amplifier. JFET Construction, working and characteristics. MOSFET Construction, working and Characteristics, Types of MOSFET.

Module IV: Power electronic devices Communication engineering

Construction, characteristics and working of SCR, DIAC, TRIAC and UJT. Introduction, Characteristics and applications of Operational Amplifier (Ic741). Modulation and its types.

Module V: Digital Logic and basic circuit Design

Number systems and conversion (DECIMAL, OCTAL, HEXADECIMAL,BINARY, BCD etc.),binary addition and subtraction, Logic Gates and their truth-table ,Boolean algebra .Design

of Single Stage Amplifier, LED Driver Circuit, Infrared Transmitter Receiver Circuit, LDR Driver Circuit, Relay Driver Circuit, Square Wave and Fix Frequency Generator using 555 IC.

Text Books

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta, TMH Publications.

2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Publications.

3. Electronic Devices and Circuits by Godse and Bakshi Technical, Vol-1 Technical Publication Pune.

Reference Books

1. Integrated Devices & Circuits by Millman & Halkias, TMH Publications.

2. Electronics Devices and Circuit Theory by R. Boylestad & L. Nashelsky, Pearson Publication
3. Electronic Communication System by G. Kennedy, TMH Publications.

4. Basic Electronics by Sanjeev Kumar & Vandana Sachdeva, Paragaon International Publication

BASIC ELECTRONICS LAB
(ECE, EEE, EE,CSE, IT)
Course code -ECE 301P

List of Experiments (Minimum 10)

1. Identification and testing of Resistors, Inductors, Capacitors, PN-Diode. Zener Diode, LED, LCD, LDR, BJT, Photo Diode, Photo Transistor,

2. Measurement of voltage and current using multimeter ,Measure the frequency and Amplitude of a signal with the help of CRO and function generator.

3. Study of p-n junction diode AND Zener Diode I-V characteristics

4. Assemble the single phase half wave and full wave bridge rectifier & the analyze effect of capacitor as a filter(only study of waveforms).

5. Study of Zener diode as voltage regulator.

6. Measurement & study of input characteristics of a BJT in CB configuration.

7. Measurement and study of characteristics of JFET and MOSFET

8. To design and simulate IR Transmitter and Receiver Circuit.

9. To design and simulate Motor Driver using Relay.

10. To design and simulate Light detector using LDR.

11. To design and simulate Constant frequency square wave generator using.

12. To design and simulate 5 volt DC power supply from 230 AC.

NOTE : At least ten experiments are to be performed, minimum 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 institution as per the scope of the syllabus.

Electrical Machines-I

(EEE, EE,)
Course code -EE 301

L	T	P	CR.
3	1	0	3

Module I: Review of Magnetic circuits and Electro-mechanical Energy Conversion

MMF, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil. Magnetic Materials, BH characteristics, Review of magnetic system, Energy in Magnetic system, Force and torque in magnetic field system, Energy balance equation, Energy conversion via electrical field, Energy in a singly excited system, Determination of the Force and Torque from energy and co-energy.

Module II: Single Phase Transformers and Autotransformers
Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, Autotransformers - construction, principle, applications and comparison with two winding transformers.

Module III: Three Phase Transformers
Concept of Three-phase connections – Star/Delta. Construction of Three phase transformer, open delta connection, phasor groups, 3-phase to 2-phase and3-phase to 6-phase connections with their applications, Three winding transformers. parallel operation and load sharing of single phaseand three phase transformers.Tap-changing transformers, No-load and on-load tap-changing of transformers,three-winding transformers, Cooling of transformers.

Module IV: DC machines

Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation – Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

Module V: DC machine - motoring and generation
Armature circuit equation for motoring and generation, Types of field excitations – separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines.

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

Reference Books:
1. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBSPublishers, 2004.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

NETWORK THEORY

(ECE, EEE, EE)
Course code -EE 302

L	T	P	CR.
3	1	0	3

Module I: Circuit Fundamentals
Voltage sources, Current sources, Conversion of voltage sources to current sources and vice a versa. Network terminology :- Node, Junction, Branch, Loop, Network solution by branch current method, Loop or Mesh current method, Node voltage method, Star delta connection and conversion. Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactance's, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC, circuits. Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Module II: Resonance Circuits
Series resonance circuit, Frequency response of a series resonant circuit, Q factor, Bandwidth, selectivity, Effect of Q on bandwidth and selectivity, Relation between bandwidth and Q,

Impedance of a series resonant circuit, Resonance by variation of L and C, Parallel resonant circuit and effect of resistance of a capacitance, Frequency response of parallel resonant circuit.

Module III: Two- Port Network
Two- port network parameters, r, y, z, h, A B C D relation between the parameters, Inter-conversion of two port networks, cascade connection series connection, series parallel connection, T and M network representation of a two port network.

Module IV: NETWORK FUNCTIONS
Laplace transform, Transform of a voltage and current, Transform of circuit elements, Network functions, Poles and zeros of the network functions, Pole zero plot, Physical significance of poles and zeroes, Stability, Two-port network parameters in the frequency domain Transient response: - step input response in RL circuit, step input response in R-C circuit, step input response in R-L-C circuit, ac transients.

Module V: FILTERS and ATTENUATORS
Definitions, classification and characteristics of different filters, filter fundamentals such as attenuation constant(alpha), phase shift (beta), propagation constant (gamma), characteristic impedance (Zo), decibel, neper. Design and analysis of constant K, M derived and composite filters (low pass, high pass, band pass, and band stop filters): T and PI sections. Definitions, classification, relation between neper and decibel, analysis and design of T type, PI type, alpha lattice, bridged –T and L types attenuators.

Text Books:

1. "A.Sudhakar, Shymmohan S. Palli, _Circuit and Network – Analysis and Synthesis', 3 rd Edition, Tata McGraw Hill Publication.
2. Van, Valkenburg; "Network analysis"; Prentice hall of India, 2000.
3. A. Chakrabarti, _Circuit theory (Analysis and Synthesis)', IIIrd edition, Dhanpat Rai and Co.

Reference Books:

1. D. Roy Choudhuri, _Networks and Systems', New Age International Publisher.
2. M.E.Van Valkenburg Network Analysis', IIIrd edition, Pearsons Education/PHI.
3.Josheph Edministrar, _Theory and Problems of Electronic Circuit (Schaum's Series) – Tata McGraw Hill Publication.
4. Soni Gupta, _Electrical Circuit Analysis', Dhanpat Rai and Co.
5. Boylestad, _Introductory Circuit Analysis', Universal Book Stall, New

NETWORK THEORY LAB

(ECE, EEE, EE)
Course code -EE 302P

List of Experiments (Minimum 10)

1. Transient response of RC circuit.

2. Transient response of RL circuit.

3. To find the resonance frequency, Band width of RLC series circuit.

4. To study and verify effect of R on frequency response of parallel resonance circuit.

5. To calculate and verify —Z" parameters of a two port network.

6. To calculate and verify "Y" parameters of a two port network.

7. To determine equivalent parameter of parallel connections of two port network.

8. To plot the frequency response of low pass filter and determine half-power frequency.

9. To plot the frequency response of high pass filters and determines the half-power frequency.

10. To plot the frequency response of band-pass filters and determines the band-width.

11. To calculate and verify "ABCD" parameters of a two port network.

12. To synthesize a network of a given network function and verify its response.

13. Introduction of P-Spice or other simulation software

ELECTROMAGNETIC FIELD THEORY

(ECE, EEE, EE)
Course code -EE 303

L	T	P	CR.
3	1	0	3

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

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

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

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

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

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

Reference Books:
1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.
2. Antenna and wave propagation by k.d parsad satya prakashan.

ENVIRONMENTAL SCIENCE

Course code – BSC 302
L T P CR.
2 0 0 0
(COMMON FOR ALL BRANCH)

Module-1

Concept and scope of Environment science, components of environment, environmental segment and their importance. (2 Lectures)

Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. (4 Lectures)

Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

(4 Lectures)

Module-IV

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air

quality standards, sampling, monitoring and control measures for pollutants. (4 Lectures)

Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

(4 Lectures)

Module-VI

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural , hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods.
(5 Lectures)

Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. (2 Lectures)

Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.
5. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.
6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E. Environmental Chemistry.