Uttarakhand Technical University, Dehradun

Scheme of Examination as per AICTE Flexible Curricula

Evaluation Scheme & Syllabus for B. Tech Second Year

W.E.F. Academic Session 2019-20

Bachelor of Technology (B. Tech.)

[Electrical & Electronics Engineering]

II Year (III & IV Semester)

Uttarakhand Technical University, Dehradun
B Tech II Year (Electrical & Electronics Engineering)
As per AICTE model curriculum
[W.E.F. Academics Session: 2019-20]

Semester III

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work Lab Work & Sessional		L	T	P	
1.	BCET 301	ES	Energy & Environmental Engineering	100	30	20	-	-	150	3	-	-	3
2.	BEST 301	BSC	Mathematics-III	100	30	20			150	3	1	-	4
3.	BEET 301 BEEP 301	DC	Electrical Measurements & Instrumentation	100	30	20	30	20	200	3	1	2	5
4.	BECT 304 BECP 304	DC	Electronic Devices	100	30	20	30	20	200	3	1	2	5
5	BEET 305 BEEP 305	DC	Networks Analysis and Synthesis	100	30	20	30	20	200	3	1	2	5
6.	BEEP 306	DC	Programming Practices	-	-	-	30	20	50	-	-	4	2
7	BASP 307		Evaluation of Internship-I Completed at I year level					50	50			4	2
8.	BASP 307	DLC	90 hrs Internship based on using various software's –Internship –II	To be completed anytime during fourth semester. Its evaluation/credit to be added in fifth semester.									3
Total				500	150	100	120	130	1000	15	4	14	26
9.	BCSP 308	MC	Cyber Security	Non-credit course									
		NSS/NCC											
*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.													

Semester IV

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work Lab Work & Sessional		L	T	P	
1.	BECT 402	DC	Signals and Systems	100	30	20	-	-	150	3	1	-	4
2.	BEET 402 BEEP 402	DC	Electrical Machine-I	100	30	20	30	20	200	3	1	2	5
3.	BECT 401 BECP 401	DC	Digital Electronics	100	30	20	30	20	200	3	1	2	5
4.	BEET 404 BEEP 404	DC	Power System-I	100	30	20	30	20	200	3	1	2	5
5.	BEET 405 BEEP 405	DC	Control System	100	30	20	30	20	200	3	0	2	5
6.	BCSP 409	DLC	Computer Programming-II (Python)	-	-	-	30	20	50	-	-	4	2
7.	BENP 407	DLC	90 hrs Internship based on using various software's –Internship –II	To be completed anytime during fourth semester. Its evaluation/credit to be added in fifth semester.									3
			Total	500	150	100	150	100	1000	15	4	10	26
8.	BCSP 408	MC	Cyber Security	Non-credit course									
			NSS/NCC										

BCET 301	Energy and Environmental Engineering	3L:1T:0P	4 Credits

Course Objectives:

The objective of this course is to apply knowledge of mathematics, science, technology and engineering appropriate to energy science and engineering degree discipline and to enhance the understanding of conventional and non-conventional energy sources and its relationship with the ecology and environment. More precisely the objectives are:

1. Use mathematical or experimental tools and techniques relevant to the energy and energy-related environmental disciplines along with an understanding of their processes and limitations.
2. Equip the students with knowledge and understanding of various possible mechanisms about renewable energy projects
3. To produce graduates strong in understanding on energy resources, technologies and systems, energy management fundamentals, and capable in innovative technological intervention towards the present and potential future energy.
4. To identify, formulate and solve energy and energy-related environmental problems by pursuing development of innovative technologies that can generate clean and sustainable energy to address energy scarcity and combat pollution and climate change.

Course Outcomes

1. Apply advanced level knowledge, techniques, skills and modern tools in the field of Energy and Environmental Engineering.
2. Distinguish the different energy generation systems and their environmental impacts.
3. Respond to global policy initiatives and meet the emerging challenges with sustainable technological solutions in the field of energy and environment.

Detailed Content

Module I:

Introduction to Energy Science - Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment, Global Energy Scenario: Role of energy in economic development. Indian Energy Scenario: Introduction to Energy resources & Consumption in India. Common terminologies

Module II

Energy Sources - Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment. Various Methods of using solar energy.

Commercial and noncommercial forms of energy, Fossil fuels, Renewable sources including: Nuclear Energy, Hydel Energy, Storage of Hydrogen, Hydrogen Production, Hydrogen Energy Geothermal, Tide and Wave Energy, Bio-fuels in India.

Module III

Energy Efficiency and Conservation - Introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy; How the economic system determines production and consumption; linkages between economic and environmental outcomes; How future energy use can be influenced by economic, environmental, trade, and Research policy.

Module IV

Energy & Environment - Environment**:** Introduction, Multidisciplinary nature of environmental studies- Definition, scope and importance, Need for public awareness. Ecosystem: Concept, Energy flow, Structure and function of an ecosystem. Food chains, food webs and ecological pyramids, Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems, Ecological succession. Environmental Pollution: Definition, Cause, effects and control measures of - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards , solid waste Management.

Module V

Environmental Protection and Ethics - Environmental Protection- Role of Government Initiatives by Non-governmental Organizations (NGO) Environmental Education. Ethics and moral values Objectives of ethics, Professional and Non- professional ethics Sustainable Development of the ecology and environment Codes of ethics and their limitations

Suggested reading material:

1. Schaeffer, John. 2007. Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living (30th anniversary edition). Gaiam.
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (eds.) 2004. Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press, 619 pages (ISBN: 0-19-926179-2)
3. Energy Management Principles: C.B.Smith (Pergamon Press)
4. Renewable Sources of Energy and Conversion Systems: N.K.Bansal and M.K.Kleeman.
5. EnergyManagement: W.R.Murphy, G.Mckay (Butterworths)
6. Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley
7. Ravindranath, N. H., & Hall, D. O. (1995). Biomass, energy and environment: a developing country perspective from India. Oxford University Press.

8. Popp, D., Newell, R. G., & Jaffe, A. B. (2010). Energy, the environment, and technological change. In Handbook of the Economics of Innovation (Vol. 2, pp. 873-937). North-Holland.

BAST 301	Mathematics – III	3L-1T-0P	4 Credits

Students Should have the knowledge of Mathematics I and Mathematics II

Course Objective:

The objective of this course is to familiarize the students with Laplace Transform, Fourier Transform, techniques in numerical methods & some statistical techniques. It aims to present the students with standard concepts and tools at B.Tech first year to superior level that will provide them well towards undertaking a variety of problems in the concern discipline.

The students will learn:

- The idea of Laplace transform of functions and their applications.
- The idea of Fourier transform of functions and their applications.
- To evaluate roots of algebraic and transcendental equations.
- Interpolation, differentiation, integration and the solution of differential equations.
- The basic ideas of statistics including measures of central tendency, correlation, regression and their properties.

COURSE OUTCOMES(s):

At the end of this course, the students will be able to:

1. Remember the concept of Laplace transform and apply in solving real life problems.
2. Understand the concept of Fourier transform to evaluate engineering problems
3. Understand to evaluate roots of algebraic and transcendental equations.
4. Understand interpolation, differentiation, integration and the solution of differential equations.
5. Understand the concept of correlation, regression, moments, skewness and kurtosis and curve fitting.

Module 1: Fourier Transforms: (8 hours)

Fourier integral, Fourier Transform, Complex Fourier transform, Inverse Transforms, Convolution Theorem, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations.

Module 2: Laplace Transform: (8 hours)

Definition of Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve linear differential equations.

Module 3: Solution of Algebraic and Transcendental equations & Interpolation (8 hours)

Number and their accuracy, Solution of algebraic and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-Falsi method. Rate of convergence of these methods (without proof),

Interpolation: Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formula.

Module 4: Numerical differentiation, Integration & Solution of ODE (8 hours)

Numerical Differentiation, Numerical integration: Trapezoidal rule, Simpson's 1/3rd and 3/8 rule Runge- Kutta method of fourth order for solving first order linear differential equations. Milne's predicator-corrector method.

Module 5: Statistical Techniques (8 hours)

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

Reference Books:

1. E. Kreyszig: Advanced Engineering Mathematics; John Wiley & Sons
2. B.V. Ramana: Higher Engineering Mathematics; Tata McGraw- Hill Publishing Company Limited, New Delhi.
3. Peter V.O' Neil. Advanced Engineering Mathematics, Thomas (Cengage) Learning
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5. T.Veerarajan : Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi.
6. R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.
7. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
8. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
9. N.P. Bali and Manish Goyal, Computer Based Numerical and Statistical Techniques , Laxmi Publications, Reprint, 2010.
10. J.N. Kapur: Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.
11. D.N.Elhance,V. Elhance & B.M. Aggarwal: Fundamentals of Statistics; Kitab Mahal Distributers, New Delhi.

BEET-301 BEEP 301	Electrical Measurements & Instrumentation	3L:1T:2P	5 Credits

Course outcomes:

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

- Able to learn the errors in measurement and use different types of instruments for the measurement
- Acquire the knowledge of electrical quantities and their measurement
- Acquire the knowledge of working of instrument transformers
- Acquire the knowledge of working of electronic instruments
- Acquire the knowledge of transducers, their classifications and applications for the measurement of physical quantities

Course outcomes:

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

- Able to understand the importance of calibration of measuring instruments
- Able to understand and learn the construction and working of different measuring instruments
- Able to understand and learn the construction and working of different AC and DC bridges, along with their applications
- Able to measure electrical engineering parameters like voltage, current, power & phase difference in industry as well as in power generation, transmission and distribution sectors
- Able to understand and acquire the capability to analyze and solving the variety of problems in the field of electrical measurements.

Unit	Topics
I	**Electrical Measurements:** Measurement system, Characteristics of instruments, Methods of measurement, Errors in Measurement & Measurement standards, Review of indicating and integrating instruments: Voltmeter, Ammeter and Wattmeter, Power, Power Factor.
II	**Measurement of Resistance, Inductance and Capacitance:** Measurement of low, medium and high resistances, insulation resistance measurement, AC bridges for inductance and capacitance measurement.
III	**Instrument Transformers:** Current and Potential transformer, ratio and phase angle errors, design considerations and testing,
IV	**Electronic Measurements:** Electronic instruments: Voltmeter, Multimeter, Wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Storage oscilloscope, Spectrum & Wave analyzer, Digital counter, frequency meter, and Digital Voltmeter.
V	**Instrumentation:** Transducers & sensors, classification & selection of sensors, Measurement of force using strain gauges, Measurement of pressure using piezoelectric sensor, Measurement of temperature using Thermistors and Thermocouples, Measurement of displacement using LVDT.

LIST OF EXPERIMENTS:

1. Calibration of AC voltmeter and AC ammeter.
2. Measurement of inductance using Maxwell's Bridge.
3. Measurement of capacitance using Schering Bridge.
4. Measurement of low resistance using Kelvin's Double Bridge.
5. Measurement of Power using CT and PT.
6. Measuring displacement using LVDT.
7. PC based data logging of temperature sensor using Lab VIEW/ MATLAB.
8. Signal conditioning of analog signal using Lab VIEW/ MATLAB.

Text/Reference Books:

1. A K Sawhney, "Electrical & Electronic Measurement & Instrument", DhanpatRai&Sons,
2. India
3. BC Nakra& K. Chaudhary, "Instrumentation, Measurement and Analysis," Tata McGraw
4. Hill 2ndEdition
5. Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH
6. Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
7. M. Stout , "Basic Electrical Measurement", Prentice Hall of India
8. WD Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
9. EW Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", AW Wheeler & Co. Pvt. Ltd. India

BECT 304 & BECP 304	ELECTRONIC DEVICES	3L-1T-2P	5 Credits

COURSE OBJECTIVE(s):

1. To understand operation of semiconductor devices.
2. To understand DC analysis and AC models of semiconductor devices.
3. To study diodes and its application
4. To study basic concepts for the design of BJT and FET

Course Outcomes:

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

1. Understand the principles of semiconductor Physics.
2. Understand and utilize the mathematical models of semiconductor junctions.
3. Understand carrier transport in semiconductors.
4. Utilize the mathematical models of MOS transistors for circuits and systems.
5. Analyze and find application of special purpose diodes.

Course Contents:

Module 1: Introduction to Semiconductor: Crystal Properties and charge Carriers in Semiconductors, Elemental and compound semiconductor materials, crystal lattice Structure, Energy bands in intrinsic and extrinsic silicon, carrier transport, diffusion current, drift current, mobility and resistivity, Hall effect.

Module 2: Generation and recombination of carriers: Poisson and continuity equation P-N junction characteristics, I-V characteristics, carrier recombination, and small signal switching models.

Module 3: Diodes and its Applications: PN Junction diode: Half & Full wave rectifier, Clipper, Clamper. Voltage multiplier. Avalanche breakdown, Zener diode, Schottky diode, LED, Solar cell, tunnel diode.

Module 4: Bipolar Junction Transistor: Basic construction, transistor action, CB, CE and CC configurations, input/output Characteristics, concept of Biasing of transistors-fixed bias, emitter bias, potential divider bias, BJT Models.

Module 5: Field Effect Transistor: JFET: Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristics equation CG, CS and CD configurations, Introduction to self and fixed biasing. MOSFFT: depletion and enhancement type MOSFET-construction, operation and characteristics.

LIST OF EXPERIMENTS

1. **Study of Lab Equipment and Components:** CRO, multimeter, and function generator, power supply- active, passive components and bread board.
2. **P-N Junction diode:** Characteristics of PN junction diode - static and dynamic resistance measurement from graph.
3. **Applications of PN Junction diode:** Half & Full wave rectifier- Measurement of V_{rms}, V_{dc}, and ripple factor.

4. **Characteristics of Zener diode:** V-I characteristics of Zener diode, graphical measurement of forward and reverse resistance.
5. **Characteristics of Photo diode:** V-I characteristics of photo diode, graphical measurement of forward and reverse resistance.
6. **Characteristics of Solar cell:** V-I characteristics of solar cell, graphical measurement of forward and reverse resistance.
7. **Application of Zener diode:** Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
8. **Characteristic of BJT:** BJT in CE configuration- graphical measurement of h- parameters from input and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
9. **Field Effect Transistors:** Single stage common source FET amplifier –plot of gain in dB Vs frequency, measurement of bandwidth and input impedance.
10. **Metal Oxide Semiconductor Field Effect Transistors:** Single stage MOSFET amplifier–plot of gain in dB Vs frequency, measurement of bandwidth and input impedance.

Textbooks/References:

1. Boylestad and Nashelsky, 'Electronic Devices and circuits' PHI, 6e, 2001.
2. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson, 2014.
3. D. Neamen , D. Biswas, "Semiconductor Physics and Devices," McGraw-Hill Education.
4. C.T. Sah, "Fundamentals of Solid State Electronics," World Scientific publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford univ. press, 2011.
6. Muhammad H. Rashid, "Electronic Devices and Circuits," Cengage publication, 2014.

BEET 304 BEEP 304	Networks Analysis and Synthesis	3L:1T:2P	5 Credits

Course Objectives:

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

- Ability to solve electrical circuits with Graphs
- To learn techniques of solving circuits involving different active and passive elements
- To analyze the behaviors of the circuit's response in time domain
- To analyze behavior of the circuit's response in frequency domain
- To understand the significance of network function

Course Outcomes:

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

- To understand basic electrical circuits with nodal and mesh analysis
- To apply Laplace transform for steady state and transient analysis
- Determine different network functions
- To understand electrical network theorems

Unit	Topics
I	**Graph Theory:** Basic circuital law, Mesh & Nodal analysis. Importance of Graph Theory in Network Analysis, Graph of a network, Definitions, planar &Non-Planar Graphs, Isomorphism, Tree, Co Tree, Link, basic loop and basic cut set, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of analysis.
II	**AC Network Theorems**: Concepts of DC Network Theorems, Electrical Sources, Basic circuital law. Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem, Tellegen's Theorem.
III	Laplace transforms and properties, Application of Laplace transforms in Electrical System, Application of Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.
IV	**Two Port Networks**- Characterization of LTI two port networks; Z, Y, ABCD & h parameters, Reciprocity and symmetry, Inter-relationships between the parameters, Interconnections of two port networks, Ladder and Lattice networks.
V	**Network Synthesis:** Concept of poles and zeros, Properties of driving point and transfer functions. Positive real function; definition and properties, Properties of LC, RC and RL driving point functions, Synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

LIST OF EXPERIMENTS:

1. Verification of principle of superposition with dc and ac sources.
2. Verification of Thevenin, Norton and Maximum power transfer theorems in ac circuits
3. Verification of Tellegin's theorem for two networks of the same topology.
4. Determination of transient response of current in RL and RC circuits with step voltage input.
5. Determination of transient response of current in RLC circuit with step voltage input for under damp, critically damp and over damp cases
6. Determination of frequency response of current in RLC circuit with sinusoidal ac input
7. Determination of z and h parameters (dc only) for a network and computation of Y and ABCD parameters.
8. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.

Text/Reference Books:

1. D. Roy Choudhary, "Networks and Systems", Wiley Eastern Ltd.
2. CL Wadhwa, "Network Analysis and Synthesis", New Age International Publishers.
3. A. Chakrabarti, "Circuit Theory", DhanpatRai& Co.
4. Reference Books:
5. Hayt, Kimmerly, Durbin, "Engineering Circuit Analysis", McGraw Hill.
6. Donald E. Scott, "An Introduction to Circuit analysis: A System Approach", McGraw Hill.
7. ME Van Valkenburg, "An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.
8. T.S.K.V. Iyer, "Circuit Theory", Tata McGraw Hill.
9. Samarjit Ghosh, " Network Theory: Analysis & Synthesis" Prentice Hall India.

BEEP 306	Programming Practices	0L:0T:4P	2 Credits

Course Objectives:

1. The course is intended to assist undergraduates in learning the basics of programming in general and programming MATLAB in particular.
2. Basics of programming in MATLAB will be covered, with the goal of having students become comfortable enough to continue learning MATLAB and other programming languages on their own.

Course Outcomes:

At the end of the course, students will be able to

1. Use MATLAB for programming purposes
2. Learn and explore MATLAB further on their own
3. Use this learning experience to learn other programming languages.

MODULE 1: INTRODUCTION

Data types and variables: Introduction to MATLAB, Data Types, Inter-conversion of Data types, MATLAB Variables, Keywords and Constant, Session Command. *MATLAB Operators and Operations:* Operators (Arithmetic, Relational, Logical, Bitwise), Set Operations, Operator Precedence, Mathematical Functions.

MODULE 2: PROGRAMMING IN MATLAB

Script and Function: Decision Making, Loops, branches, Functions, Working on Script File (Creating, Saving and Executing), MATLAB I/O, Formatted I/O Method.

MODULE 3: ARRAYS AND GRAPHICS

Matrices and Arrays: Introduction to Matrices, Operations on Arrays/Matrices, Manipulations of Arrays/Matrices, Expansion of Matrix Size, Reduction of Matrices/Arrays order,

Graphics: Introduction to plot, Basic 2-D Plots (Style options, Labels, Axis control, etc.), specialized 2-D Plots, drawing multiple plots. Using MATLAB for fractals and chaos and Conway game of life

MODULE 4: FILE HANDLING AND DEBUGGING

File Handling: Introduction to file handling, working on files, accessing of Text File, Saving/ Loading MATLAB Variables, reading data without opening file, reading and writing Excel.

Debugging: Introduction to debugging, Break points, debugger, stepping, watching variable values, debugging commands.

REFERENCES:

1. Delores M. Etter, David C. Kuncicky, Holly Moore, "*Introduction to MATLAB 7.0*", Pearson, 2013.
2. Rudra Pratap, "*Getting Started with MATLAB*", OXFORD University Press, 2010.
3. Agam Kumar Tyagi, "*MATLAB and Simulink for Engineers*", University Press, 2012.

WEB REFERENCES

https://ocw.mit.edu/courses/mathematics/18-s997-introduction-to-matlab-programming- fall-2011/syllabus/

BCST 308	Cyber Security	Non- Credit Course

1. Understand the basic concept of Cyber Security.
2. Understand the basic concept of Viruses.
3. Understand the basic concept of Digital Attacks.
4. Understand the basic concept of Phishing.
5. Understand the basic concept of Cyber Law.

Course Outcomes:

After the completion of this course the student will able to:

1. Know about various attacks and viruses in cyber systems
2. Know about how to prevent digital attacks
3. Know about how to prevent Phishing Attacks
4. Know about how to do secure transactions

MODULE-1

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

MODULE-2

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control.

Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

MODULE-3

Developing Secure Information Systems, Application Development Security, Information Security

Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets,

Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

MODULE-4

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the Policies.

Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

References:

1. Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analysing Computer Security ", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
3. 3.Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla ,"Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill. 5. CHANDER, HARISH," Cyber Laws And It Protection " , PHI Learning Private Limited ,Delhi ,India

BECT 402	Signals & System	3L-1T-0P	4 Credits

Course Objective:

The objectives of this course are

1. To develop good understanding about signals, systems and their classification to provide with necessary tools and techniques.
2. To analyze electrical networks and systems to develop expertise in time-domain and frequency domain approaches to the analysis of continuous and discrete systems.
3. To introduce to the basics of probability, random variables and the various distribution and density functions;
4. To develop students' ability to apply modern simulation software to system.

COURSE OUTCOME(s):

Upon the completion of the course, students will be able to:

1. Analyze the properties of signals & systems
2. Apply Laplace transform, Fourier transform, Z transform and DTFT in signal analysis
3. Analyze continuous time LTI systems using Fourier and Laplace Transforms
4. Analyze discrete time LTI systems using Z transform and DTFT

Module 1: Signals and Systems: Continuous-time and discrete-time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, Continuous-Time and Discrete-Time LTI Systems and their properties.

Module 2: Time domain representation of LTI System: Time domain representation of LTI System: System modeling: Input-output relation, definition of impulse response, convolution sum, convolution integral, computation of convolution integral and convolution sum using graphical method for unit step to unit step, unit step to exponential only. Properties of Convolution. Introduction to basic signals simulation using MATLAB.

Module 3: Fourier series and Fourier Transform: The response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-time Periodic Signals and their Properties, Continuous time and discrete time Fourier Transforms and their properties, System Characterized by Linear Constant Coefficient Differential equations and Difference equation.

Module 4: Sampling and Laplace Transform: Signal representation by samples, sampling theorem, Impulse train sampling, sampling of discrete time signals, discrete time processing of continuous time signals. Laplace Transform, Region of convergence, inverse Laplace Transform, Analysis and characterization of LTI System, Block diagram representation, Unilateral Laplace transform.

Module 5: Z-Transform: Z-Transform, Region of convergence, Inverse Z-transform, analysis and characterization of LTI system, Block diagram representation, Unilateral Z-transform.

Text/Reference books:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems," Pearson, 2015.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete," 4th edition, Prentice Hall, 1998.
3. B.P. Lathi, "Signal Processing and Linear Systems," Oxford University Press, 1998.
4. Douglas K. Lindner, "Introduction to Signals and Systems," McGraw Hill International Edition: 1999.
5. Simon Haykin, Barry van Veen, "Signals and Systems," John Wiley and Sons (Asia) Private Limited, 1998.
6. V. Krishnaveni, A. Rajeswari, ""Signals and Systems," Wiley India Private Limited, 2012.
7. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems," John Wiley and Sons, 1995.
8. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB," TMH, 2003.
9. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems," TMH New Delhi, 2001.
10. A. Anand Kumar, "Signals and Systems," PHI 3rd edition, 2018.
11. D. Ganesh Rao, K.N. Hari Bhat, K. Anitha Sheela, "Signal, Systems, and Stochastic Processes," Cengage publication, 2018.

BEET 402 & BEEP 402	Electrical Machines-I	3L:1T:2P	5 Credits

COURSE OUTCOMES (COs):

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

- Able to learn and analyze the various principles & concepts involved in Electromechanical Energy conversion
- Acquire the knowledge and Demonstrating the constructional details of DC machines as well as transformers
- Acquire the knowledge of working of transformers
- Acquire the knowledge of working of DC machines
- Acquire the knowledge of performance of transformers, individually and in parallel operation

Unit	Topic
I	**Principles of Electro-mechanical Energy Conversion:** Introduction, Review of magnetic system, Energy in Magnetic system, Force and torque in magnetic field system, Energy balance equation, Energy conversion via electrical field, Energy in a singly excited system, Determination of the Force and Torque from energy and co-energy, Generation of EMF in Machines, Torque in machine with cylindrical air gap.
II	**DC Machines-I:** Principle & Construction, Classification and circuit model, EMF equation of generator and torque equation of motor. Armature winding (Concentrated and Distributed), Armature reaction, Commutation, Interpoles and compensating windings, Performance characteristics of DC generators, Applications.
III	**DC Machines-II:** Performance characteristics of DC motors, Starting of DC motors; 3 point and 4 point starters, Speed control of DC motors; Field control, Armature control and Voltage control (Ward Leonard method); Efficiency and Testing of DC machines (Hopkinson's and Swinburne's Test), Applications, Introduction to Brushless DC Motor, stepper motor and DC Servo motor and their applications.
IV	**Single Phase Transformer:** Construction & Principle, Ideal and practical transformer, equivalent circuit & phasor diagram, losses in transformers. Efficiency and voltage regulation, all day efficiency, Testing of Transformers- O.C. and S.C. tests, Polarity test, Sumpner's test. Auto Transformer- Single phase and three phase autotransformers, Volt-amp relation, Copper saving in autotransformer, Efficiency, Merits & demerits and applications.
V	**Three Phase Transformers:** Construction, Three phase transformer, phasor groups and their connections, open delta connection, three phase to 2 phase and their applications, Three winding transformers. Parallel operation of single phase and three phase transformers and load sharing.

Experiments

1. To obtain magnetization characteristics of a DC shunt generator
2. To obtain load characteristics of a DC shunt generator and compound generator (a)

Cumulatively compounded (b) Differentially compounded

3. To perform Hopkinson's test and determine losses and efficiency of DC machine
4. To obtain speed-torque characteristics of a dc shunt motor
5. To obtain speed control of DC shunt motor using (a) armature resistance control (b) field control
6. To study polarity and ratio test of single phase and 3-phase transformers
7. To obtain equivalent circuit, efficiency and voltage regulation of a single phase transformer using O.C. and S.C. tests.
8. To obtain efficiency and voltage regulation of a single phase transformer by Sumpner's test.

Text/Reference 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.
5. H. Cotton, "Electrical Technology", CBS Publication.
6. MG Say, "The Performance and Design of AC machines", Pit man& Sons.
7. PS Bimbhra, " Generalized Theory".

BECT 401 & BECP 401	DIGITAL ELECTRONICS	3L-1T-2P	5 Credits

COURSE OBJECTIVE(s):

The objectives of this course are to:

1. Introduce the concept of digital and binary systems
2. Be able to design and analyze combinational logic circuits.
3. Be able to design and analyze sequential logic circuits.
4. Understand the basic software tools for the design and implementation of digital circuits and systems.
5. Reinforce theory and techniques taught in the classroom through experiments and projects in the laboratory.

COURSE OUTCOME(s):

1. After successful completion of the course student will be able to
2. Develop a digital logic and apply it to solve real life problems.
3. Analyze, design and implement combinational logic circuits.
4. Classify different semiconductor memories.
5. Analyze, design and implement sequential logic circuits.
6. Analyze digital system design using PLD.
7. Simulate and implement combinational and sequential circuits.

Course Contents:

Module 1:
Number Systems Binary Codes: Number System and its arithmetic, conversion between bases, Boolean algebra, Canonical form, SOP & POS forms, Minimization of Boolean Functions: K Map (upto 5 variables), Quine-Mcclusky method, Error detection & correcting codes, Hamming codes, Binary codes.

Module 2:
Combinational Logic Circuits: Introduction to Combinational Circuits, Analysis and Design Procedure, Binary Adder, Subtractor, Parallel Adder/Subtractor, Carry Look Ahead Adder, Decoder, Encoder, Priority Encoder, Digital Multiplexer, Magnitude Comparator. Programmable Logic Devices, PLA & PAL.

Module 3:
Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, Flip Flops: SR, JK, D and T Type, Timing and Triggering Consideration, JK Master Slave, Excitation Table of all Flip Flops, Conversion from one type of Flip-Flop to another.

Counters: Asynchronous and Synchronous Counters, Design of Up Counters, Design of Down Counters, Mod Counter, Lock-Out table, Self-Starting Counter.

Module 4:

Finite State Machine: Mealy and Moore machines, State Table, State Diagram, Reduction of State Table, FSM Design Steps, Counter Design Using FSM.

Logic Families: Classification of Logic Families, Parameters: Propagation Delay, Power Dissipation, Fan-in, Fan-out, Noise Margin. TTL Family, TTL output configurations, ECL Family, IIL Family, MOS Family. Logic gate design using TTL and MOS.

Module 5:

Hazard, Fault Detection: Hazard and Fault Detection, Static Hazards, Dynamic Hazards, Determination of Hazards in Combinational Circuits. Fault Detection Using Fault Table and Path Sensitizing Methods.

Memories: Sequential Access Memories, Random Access Memories, RAM, ROM, PROM, EPROM, EEPROM, Static and Dynamic RAM cells using nMOS CMOS, Memory Size Expansion.

List of Experiments:

1. Introduction to Digital Electronics lab- nomenclature of digital ICS.
2. Implementation of the given Boolean function using logic gates in both sop and pos forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of decoder/de-multiplexer and encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. To design and verify operation of half adder and full adder.
8. To design & verify the operation of magnitude comparator.
9. Design and verify the 4-bit synchronous counter.
10. Design and verify the 4-bit asynchronous counter.

Textbooks/References:

1. M. Morris Mano and M. D. Ciletti, Digital Fundamental, 4th, Edition, Pearson.
2. Digital Systems: Principles and Design, Raj Kamal, Pearson.
3. Fundamentals of Digital Circuits A. Anand Kumar PHI 3rd Edition, 2014.
4. Digital Fundamental, Thomas L Floyd, 11th Edition

BENT-404	Power System-I	3L:1T:2P	5 Credits

COURSE OUTCOMES (COs):

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

- Acquire the knowledge of Power System Components, its element, transmission line, OHTL etc.
- Acquire the knowledge of corona and insulator and its calculation
- Acquire the knowledge of Design of transmission line, EHV AC and HVDC Transmission,
- Acquire the knowledge of Insulated cables Grounding and Insulated cables
- Acquire knowledge of High and extra high voltage transmission.

Unit	Topics
I	**Power System Components:** Single line Diagram of Power system, Brief description of power system **Elements:** Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator Supply System Different kinds of supply system and their comparison, choice of transmission voltage **Transmission Lines:** Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect
II	**Over Head Transmission Lines:** Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading
III	**Corona and Interference:** Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference. Electrostatic and electromagnetic interference with communication lines **Overhead line Insulators:** Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency
IV	**Mechanical Design of transmission line:** Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers **Insulated cables:** Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables.
V	**Neutral grounding:** Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices **Electrical Design of Transmission Line:** Design consideration of EHV transmission lines, choice of voltage, number of circuits, conductor configuration, insulation design, selection of ground wires.

Experiments

1. MATLAB Program to Simulate Ferranti Effect
2. MATLAB Program to Model Transmission Lines
3. To observe the voltage distribution across an Insulator String
4. To study of Sag and factors effecting on Sag of Transmission Line
5. Study of Corona Discharge and AC Breakdown Voltage for Different Electrode-Gap Geometry.
6. Three phase short circuit analysis in a Synchronous Machine using MATLAB/ SIMULINK.
7. Z-bus Building Algorithm using MATLAB.

Text/Reference Books:

1. W. D. Stevenson, “Element of Power System Analysis”, McGraw Hill
2. C. L. Wadhwa, “Electrical Power Systems” New age international Ltd. Third Edition
3. AsfaqHussain, “'Power System”, CBS Publishers and Distributors
4. B. R. Gupta, “Power System Analysis and Design” Third Edition, S. Chand & Co.
5. M. V. Deshpande, “Electrical Power System Design” Tata McGraw Hill
6. Soni, Gupta &Bhatnagar, “A Course in Electrical Power”, DhanpatRai& sons
7. S.N.Singh, “ Electric Power Generation, Transmission& distribution.” PHI Learning

BEET-405 & BEEP 405	Control System	3L:1T:2P	5 Credits

COURSE OUTCOMES (COs):

- Students will be able to learn the basics of various types of control systems and automatic systems.
- Students will be able to build the mathematical model of system from differential equation and vice versa and shall know the better effects of feedback due to parameter variations.
- Students will be able to apply the basic knowledge to formulate the input output relationship of various component used in control system and their applications in building control system.
- Students will be able to perform and study a time domain analysis of control system and different performance measures and finally know about behavior of the system.
- Students will be able to learn the concept of stability , poles and zeros , using routh Hurwitz criteria and relative stability by bode plot, polar plot, Nyquist plot and be able to design and analyze the given system in frequency domain.

Detailed Content

Module I: The Control System: Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback

Module II: Time Response analysis: Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants Design specifications of second order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices

Module III: Control System Components: Constructional and working concept of ac servomotor, synchros and stepper motor Stability and Algebraic Criteria concept of stability and necessary conditions, Routh Hurwitz criteria and limitations Root Locus Technique: The root locus concepts, construction of root loci

Module IV: Frequency response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles

Module V: Introduction to Design: The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain.

Experiments

1. To study P, PI and PID temperature controller for an oven and compare their performance.
2. To design Lag, Lead and Lag-Lead compensators using Bode plot.
3. To study DC position control system
4. To study synchro-transmitter and receiver and obtain output V/S input characteristics

5. To determine speed-torque characteristics of an ac servomotor.
6. To study behavior of separately excited dc motor in open loop and closed loop conditions at various loads.
7. To determine time domain response of a second order system for step input and obtain performance parameters.
8. To plot root locus diagram of an open loop transfer function and determine range of gain ‘k’ for stability.
9. To plot a Bode diagram of an open loop transfer function.
10. To draw a Nyquist plot of an open loop transfer functions and examine the stability of the closed loop system.

Reference Books:

1. Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co.
2. M.Gopal, “Control System; Principle and design”, Tata McGraw Hill.
3. M.Gopal,” Modern Control system”, Tata McGraw Hill.
4. D.Roy Choudhary, “Modern Control Engineering”, Prentice Hall of India.

BCSP-409	Computer Programming-II (Python)	0L:0T:4P	2 Credits

1. Write a Python program to display the current date and time.
2. Write a Python program which accepts the radius of a circle from the user and compute the area.
3. Write a Python program which accepts the user's first and last name and print them in reverse order with a space between them.
4. Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list.
5. Write a Python program to display the first and last colors from the following list. Color_List = ["Red","Green","White" ,"Black"]
6. Write a Python program that accepts an integer (n) and computes the value of n+nn+nnn.
7. Write a Python program to print the calendar of a given month and year.
8. Write a Python program to calculate number of days between two dates. Sample dates: (2014, 7, 2), (2014, 7, 11)
9. Write a Python program to get the volume of a sphere with radius 6. Write a Python program to get the difference between a given number and 17, if the number is greater than 17 return double the absolute difference.
10. Write a Python program to calculate the sum of three given numbers, if the values are equal then return three times of their sum.
11. Write a Python program to get a new string from a given string where "Is" has been added to the front. If the given string already begins with "Is" then return the string unchanged.