DR.A.P.J.ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus
For
B.Tech. 2nd Year

- **Electrical Engineering**
- **Electrical & Electronics Engineering**

(Effective from session 2023-24)

DR.A.P.J.ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

SEMESTER –III

SN	Subject Code	Subject	Type	Category	Periods			Sessional Component		Sessional (SW) (TS/PS)	End Semester Examination (ESE)	Total SW+ESE	Credit Cr
					L	T	P	CT	TA	CT+TA	TE/PE		
1	BOE3** / BAS303	Science Based Open Elective/BSC (Maths-III/Math IV/ Math V)	T	ES/BS	3	1	0	20	10	30	70	100	4
2	BVE301 / BAS301	Universal Human Value and Professional Ethics/ Technical Communication	T	VA/HS	2	1	0	20	10	30	70	100	3
3	BEE301	Electromagnetic Field Theory	T	PC	3	1	0	20	10	30	70	100	4
4	BEE302	Electrical Measurements & Instrumentation	T	PC	3	1	0	20	10	30	70	100	4
5	BEE303	Basic Signals & Systems	T	PC	2	1	0	20	10	30	70	100	3
6	BEE351	Circuit Simulation Lab	P	PC	0	0	2		50	50	50	100	1
7	BEE352	Electrical Measurements and Instrumentation Lab	P	PC	0	0	2		50	50	50	100	1
8	BEE353	Electrical Workshop	P	PC	0	0	2		50	50	50	100	1
10	BCC301 / BCC302	Cyber Security/Python programming	T	VA	2	0	0	20	10	30	70	100	2
11	BCC351	Internship Assessment /Mini Project*	P							100		100	2
		Total			**15**	**5**	**6**						**25**

- **Mathematics –III** for CE / ENV and allied branches
- **Mathematics-IV** for Computer/Electronics/Electrical & allied Branches, Mechanical & Allied Branches Textile/Chemical & allied Branches
- **Mathematics-V** for Bio Technology / Agriculture Engineering

SEMESTER –IV

SN	Subject Code	Subject	Type	Category	Periods			Sessional Component		Sessional (SW) (TS/PS) CT+TA	End Semester Examination (ESE) TE/PE	Total SW+ESE	Credit Cr
					L	T	P	CT	TA				
1	BAS403 / BOE4**	BSC(Maths-III/Math IV/ Math V)/Science Based Open Elective	T	BS/ES	3	1	0	20	10	30	70	100	4
2	BAS401 / BVE401	Technical Communication / Universal Human Value and Professional Ethics	T	HS/VA	2	1	0	20	10	30	70	100	3
3	BEE401	Digital Electronics	T	PC	3	1	0	20	10	30	70	100	4
4	BEE402	Electrical Machines-I	T	PC	3	1	0	20	10	30	70	100	4
5	BEE403	Networks Analysis & Synthesis	T	PC	2	1	0	20	10	30	70	100	3
6	BEE451	Network Analysis & Synthesis Lab	P	PC	0	0	2		50	50	50	100	1
7	BEE452	Electrical Machines-I Lab	P	PC	0	0	2		50	50	50	100	1
8	BEE453	Digital Electronics Lab	P	PC	0	0	2		50	50	50	100	1
9	BCC402 / BCC401	Python Programming/Cyber Security	P	VA	2	0	0	20	10	30	70	100	2
10	BVE451 / BVE452	Sports and Yoga - II / NSS-II	P	VA	0	0	3			100		100	0
		Total			**15**	**5**	**9**						**23**
		Minor Degree/ Honors Degree MT-1/HT-1											

*The Mini Project or internship (4 weeks) will be done during summer break after 4th Semester and will be assessed during V semester.

SYLLABUS
BEE301- ELECTROMAGNETIC FIELD THEORY

Course Outcomes:		Knowledge Level, KL
Upon the completion of the course, the student will be able to:		
CO1	Apply different coordinate systems and their application in electromagnetic field theory, establish a relation between any two systems and also understand the vector calculus.	K_3
CO2	Understand the concept of static electric field. Understand the concept of current and properties of conductors. Establish boundary conditions and to calculate capacitances of different types of capacitors	K_4
CO3	Understand the concept of static magnetic field, magnetic scalar and vector potential	K_4
CO4	Understand the forces due to magnetic field, magnetization, magnetic boundary conditions and inductors.	K_4
CO5	Understand displacement current, time varying fields, propagation and reflection of EM waves and transmission lines.	K_3

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

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

Detailed Syllabus:

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

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

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

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

Unit V

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

Text Book: 1. MNO Sadiku, "Elements of Electromagnetic', Oxford University Press.
Reference Books: 1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.

BEE302- ELECTRICAL MEASUREMENTS & INSTRUMENTATION

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:	Knowledge Level, KL
At the end of this course students will demonstrate the ability to:	
CO 1 Evaluate errors in measurement as well as identify and use different types of instruments for the measurement of voltage, current.	K_1
CO2 Demonstrate the construction and working of different measuring instruments for Power, energy and frequency measurements.	K_2
CO3 Demonstrate the construction and working of different AC and DC bridges, along with their applications.	K_2
CO4 Demonstrate the working of instrument transformers as well as calculate the errors in current and potential transformers, Manifest the working of electronic instruments like voltmeter, multi-meter, frequency meter and CRO and ability to measure electrical engineering parameters like voltage, current, power, phase difference and frequency.	K_2
CO5 Display the knowledge of transducers, their classifications and their applications for the measurement of physical quantities like motion, force, pressure, temperature, flow and liquid level.	K_3

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

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

Detailed Syllabus:

UNIT I
ELECTRICAL MEASUREMENTS & INTRODUCTION TO MEASURING INSTRUMENTS: Measurement system, Characteristics of instruments, Methods of measurement, Errors in Measurement & Measurement standards, Classification of Instrument – deflecting, controlling and damping torques – Ammeters and Voltmeters – PMMC, moving iron, Electrostatic, induction type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range of instruments.

UNIT II
MEASURMENT OF POWER & ENERGY: Types of watt meters, Single phase dynamometer & induction type wattmeter, Expression for deflecting and control torques. Measurement of active and reactive power in balanced and unbalanced three phase systems, theory and operation of single & three phase induction type energy meter, power factor meter & analog frequency meter.

UNIT III
POTENTIOMETERS, DC & AC BRIDGES: Principle and operation of D.C. Crompton's potentiometer standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers. Method of measuring low, medium and high resistance – sensitivity of wheat-stone's bridge – Kelvin's double bridge for measuring low resistance. Measurement of inductance-Maxwell's bridge, Hay's bridge, Anderson's bridge, Owens's bridge. Measurement of capacitance and loss angle – Desauty's bridge, Wien's bridge, Schering Bridge.

UNIT IV

INSTRUMENT TRANSFORMER & ELECTRONIC MEASUREMENTS: CT and PT Construction and working, Ratio and phase angle errors, testing and design considerations. Electronic Voltmeter- Ammeter, Multimeter, Wattmeter & Energy meter, Principle of CRO, Time, Frequency and phase angle measurements using CRO. Spectrum & Wave analyzer and Digital Voltmeter.

UNIT V

TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principal operation of LVDT and capacitor transducers, LVDT Applications, Strain and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

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

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

BEE303- BASIC SIGNAL & SYSTEMS

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

Course Outcomes:	Knowledge Level, KL
Upon the completion of the course, the student will be able to:	
CO 1 Represent the various types of signals & systems and can perform mathematical operations on them.	K_2
CO2 Analyze the response of LTI system to Fourier series and Fourier transform and to evaluate their applications to network analysis.	K_4
CO3 Analyze the properties of continuous time signals and system using Laplace transform and determine the response of linear system to known inputs.	K_4
CO4 Implement the concepts of Z transform to solve complex engineering problems using difference equations.	K_3
CO5 Develop and analyze the concept of state-space models for SISO & MIMO system.	K_4

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

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

Detailed Syllabus:

UNIT I
Pre- Requisites: *Differential Equations.*
Introduction to Continuous Time Signals and Systems: Introduction to continuous time and discrete time signals, Classification of signals with their mathematical representation and characteristics. Transformation of independent variable, Introduction to various type of system, basic system properties.
Analogous System: Linear& Rotational mechanical elements, force-voltage and force-current analogy,
modeling of mechanical and electro-mechanical systems: Analysis of first and second order linear systems by classical method.

UNIT II
Pre- Requisites: *Fourier Series & Fourier Transform*
Fourier Transform Analysis:, Fourier symmetry, Fourier transform: Properties, application to network analysis. Definition of DTFS, and DTFT, Sampling Theorem.

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

UNIT IV

Pre- Requisites:*Matrix Calculations.*

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

UNIT V

Pre- Requisite: *Z-Transforms.*

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

Text Books:
1. Oppenhiem, Wilsky, Nawab, "Signals & Systems", Pearson Education, 2015
2. Anand Kumar, "Signals & Systems", PHI
3. Choudhary D. Roy, "Network & Systems", Wiley Eastern Ltd.

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

BEE351- CIRCUIT SIMULATION LAB

Pre-requisites of course: Basic Electrical Engineering

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

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

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

List of Experiments

Ten experiments to be performed

1. Verification of principle of Superposition with AC sources using Multisim/ PSPICE.

2. Verification of Thevenin and Maximum Power Transfer theorems in AC Circuits using Multisim/ PSPICE.
3. Verification of Norton theorems in ACCircuits using Multisim/ PSPICE.

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

12. To determine attenuation characteristics of a low pass / high pass active filters.

Note: Any two experiments from above list should also be performed by students on Virtual Lab.

BEE352- ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

Pre-requisites of course: Basic Electrical Engineering

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

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

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

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

1. Calibration of AC voltmeter and AC ammeter.
2. Measurement of inductance using Maxwell's Bridge.
3. Measurement of capacitance using Schering Bridge.
4. Measurement of low resistance using Kelvin's Double Bridge.
5. Measurement of Power using CT and PT.
6. Measuring displacement using LVDT.
7. Measuring temperature using thermocouple.
8. Measuring pressure using piezoelectric pick up.
9. Measurement of speed of DC motor by photoelectric pick up.
10. Speed measurement using Hall Effect sensor.
11. PC based data logging of temperature sensor using LabVIEW/ MATLAB.
12. Signal conditioning of analog signal using LabVIEW/ MATLAB.

Note: Any two experiments from above list should also be performed by students on Virtual Lab.

BEE353- ELECTRICAL WORKSHOP

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

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

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

Detailed Syllabus:

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

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

SEMESTER –IV

BEE401- DIGITAL ELECTRONICS

Course Outcomes:	Knowledge Level, KL
At the end of this course students will demonstrate the ability to:	
CO 1 Perform number style arithmetic and logic simplification using various methods.	K_3
CO2 Design and analyze modular combinational circuits with MUX / DEMUX, Decoder & Encoder	K_4
CO3 Design & analyze synchronous sequential logic circuits	K_4
CO4 Analyze various logic families and design circuits using PLDs.	K_3
CO5 Design various ADCs and DACs according to the given specifications.	K_3

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

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

Detailed Syllabus

UNIT I

Logic simplification and combinational logic design: Number Systems, Binary arithmetic, signed magnitude representation , Binary codes, code conversion, review of Boolean algebra and Demorgan's theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 5 variables, tabulation method.

UNIT II

Analysis and Design of combinational circuits, MSI devices like comparators, multiplexers, demultiplexers, encoder, decoder, circuit realization using Multiplexers and decoders, half and full adders, subtractors, serial and parallel adders, BCD adder, barrel shifter.

UNIT III

Sequential logic design: Building blocks like S-R, JK and Master-Slave JK FF, D FF, T FF, edge triggered FF, Flip flop conversion, Applications of Flip Flops: ripple and synchronous counters, Ring counter, Johnson counter, shift registers: SISO, SIPO, PISO, PIPO, Bidirectional shift register, Universal shift register; Finite state machines: Mealy and Moore machines, State diagrams, state reduction, Analysis of clocked sequential circuits, Design of clocked sequential circuits,

UNIT IV

Logic families and semiconductor memories: A TTL NAND gate, specifications, noise margin, propagation delay, fan-in, fan-out, tristate TTL, ECL, CMOS families and their interfacing, memory elements, concept of programmable logic devices like FPGA, logic implementation using programmable devices.

UNIT V

Memory & Programmable Logic Devices: Specifications of DACs, Weighted resistor, R-2R ladder, Analog-to-digital converters (ADC): Specifications of ADCs, principle of ADC, switched capacitor circuits: Basic concept, practical configurations, ADC etc. ADC Types: dual slope, successive approximation, counting type, flash etc.

Text Books:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.
4. A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.

BEE402- ELECTRICAL MACHINES – I

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

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

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

Detailed Syllabus:

UNIT I
Pre- Requisites: *Magnetic Materials, BH characteristics*

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

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

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

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

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

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

UNIT V

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

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

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

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

BEE403- NETWORK ANALYSIS & SYNTHESIS

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

Course Outcomes:		Knowledge Level, KL
Upon the completion of the course, the student will be able to:		
CO1	Apply the knowledge of basic circuital law, nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach.	K_3
CO2	Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems.	K_4
CO3	Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods.	K_4
CO4	Demonstrate the concept of complex frequency and analyze the structure and function of one and two port network. Also evaluate and analysis two-port network parameters.	K_4
CO5	Synthesize one port network and analyze different filters.	K_4

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

Detailed Syllabus:

UNIT I
Graph Theory:
Pre- Requisites: *Basic circuital law, Mesh & Nodal analysis.*
Importance of Graph Theory in Network Analysis, Graph of a network, Definitions, planar &Non-Planar Graphs, Isomorphism, Tree, Co Tree, Link, basic loop and basic cutset, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of analysis.

Unit II
AC Network Theorems (Applications to dependent & independent sources):
Pre- Requisites: *Concepts of DC Network Theorems, Electrical Sources&Basic circuital law.* Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem, Tellegen's Theorem.

Unit III
Transient Circuit Analysis:
Pre- Requisites: *Laplace Transform& Concept of Initial conditions.*
Natural response and forced response, Transient behaviour of RL, RC and RLC networks, Evaluation of initial conditions, Transform Impedance, Transient response and steady state response for arbitrary inputs (DC and AC), Evaluation of time response of RL, RC and RLC networks with and without initial conditions both through classical and Laplace transform methods.

Unit IV

Network Functions:

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

Concept of complex frequency, Network functions of one port and two port networks, Concept of poles and zeros, Properties of driving point and transfer functions. Two Port Networks- Characterization of LTI two port networks; Z, Y,ABCD, g and h parameters, Reciprocity and symmetry, Inter-relationships between the parameters, Inter- connections of two port networks, Ladder and Lattice networks: T & Π representation, terminated two Port networks.

Unit V

a.   Network Synthesis:

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

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

b. Filters

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

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

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

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

BEE451- NETWORK ANALYSIS AND SYNTHESIS LAB

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:	Knowledge Level, KL
At the end of this course students will demonstrate the ability to:	
CO 1 Understand basics of electrical circuits with nodal and mesh analysis.	K2
CO2 Appreciate electrical network theorems.	K3
CO3 Analyse RLC circuits.	K3
CO4 Determine the stability of an electrical circuit.	K2
CO5 Design network filters.	K2

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

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

List of Experiments

Ten experiments to be performed:

1. Verification of Maximum power transfer theorem.
2. Verification of Tallegen's theorem.
3. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
4. Design and find cut-off frequency of low pass and high pass filters.
5. Design and find the pass band frequencies of band pass filters.
6. Design and find the stop band frequencies of band reject filters.
7. Determination of two port network Z and h parameters.
8. Verification of parameters properties in interconnection of 2, two port networks in series-series interconnection.
9. Verification of parameters properties in interconnection of 2, two port networks in parallel-parallel interconnection.
10. Determination of Z parameters of a T network and Computation of corresponding parameters to equivalent π network.
11. To perform the transient response of RL circuit.
12. Verification of parameters properties in interconnection of 2, two port networks in cascade interconnection.

Note: Any two experiments from above list should also be performed by students on Virtual Lab.

BEE452- ELECTRICAL MACHINES-I LAB

Pre-requisites of course: Basic Electrical Engineering

Course Outcomes:	Knowledge Level, KL
Upon the completion of the course, the student will be able to:	
CO1 Analyze and conduct basic tests on DC Machines and single-phase Transformer	K2
CO2 Obtain the performance indices using standard analytical aswell as graphical methods.	K3
CO3 Determine the magnetization, Load and speed-torque characteristics of DC Machines.	K3
CO4 Demonstrate procedures and analysis techniques to perform electromagnetic and electromechanical tests on electrical machines.	K2

KL- Bloom's Knowledge Level (K₁, K₂, K₃, K₄, K₅, K₆)

K₁ – Remember K₂ – Understand K₃ – Apply K₄ – Analyze K₅ – Evaluate K₆ – Create

List of Experiments

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

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

Note: Any two experiments from above list should also be performed by students on Virtual Lab.

BEE453- DIGITAL ELECTRONICS LAB

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

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

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder using logic gates.
5. Implementation and verification of Encoder using logic gates.
6. Implementation of 4:1 multiplexer using logic gates.
7. Implementation of 1:4 demultiplexer using logic gates.
8. Implementation of 4-bit parallel adder using 7483 IC.
9. Design, and verify the 4-bit synchronous counter.
10. Design, and verify the 4-bit asynchronous counter.
11. Implementation of Mini Project using digital integrated circuit's and other components.

Note: Any two experiments from above list should also be performed by students on Virtual Lab.

Mathematics –IV

(PDE, Probability and Statistics)

Computer/Electronics/Electrical & Allied Branches, CS/IT, EC/IC, EE/EN,

Mechanical& Allied Branches, (ME/AE/AU/MT/PE/MI/PL)

Textile/Chemical & Allied Branches, TT/TC/CT, CHE/FT

Subject Code	BAS303/ BAS303H/ BAS403/BAS403H				
Category	Basic Science Course				
Subject Name	MATHEMATICS-IV(PDE, Probability and Statistics)				
Scheme and Credits	**L-T-P**	**Theory Marks**	**Sessional**		**Total**	**Credit**
			Test	**Assig/Att.**		
	3—1—0	70	20	10	100	4
Pre- requisites (if any)	Knowledge of Mathematics I and II of B. Tech or equivalent				

Course Outcomes

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

The students will learn:

- The idea of partial differential equation and its different types of solution.
- The concept ofmethod of separation of variables and Fourier transform to solve partial differential equations.
- The basic ideas of statistics including measures of central tendency, correlation, regression and their properties.
- The idea of probability, random variables, discrete and continuous probability distributions and their properties.
- The statistical methods of studying data samples, hypothesis testing and statistical quality control.

Module I: Partial Differential Equations   8

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

Module II: Applications of Partial Differential Equations and Fourier Transform   8

Method of separation of variables,Solution of one dimensional heat equation, wave equation, Two dimensional heat equation (only Laplace Equation) and their application, Complex Fourier transform, Fourier sine transform, Fourier cosine transform, Inverse transform, convolution theorem, Application of Fourier Transformto solve partial differential equation.

Module III: Statistical Techniques I   8

Overview of Measures of central tendency, Moments, 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.

Module IV: Statistical Techniques II   8

Overview of Probability Random variables (Discrete and Continuous Random variable) Probability mass function and Probability density function, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poission and Normal distributions.

Module V: Statistical Techniques III   8

Introduction of Sampling Theory, Hypothesis, Null hypothesis, Alternative hypothesis, Testing a Hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, t-test, Z-test and Chi-square test, Statistical Quality Control (SQC) , Control Charts, Control Charts for variables (X and R Charts), Control Charts for Variables (p, np and C charts).

Text Book:
1. Dr. B.S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Dehli.

Reference Book:
1. Peter V. O'Neil, "Advance Engineering Mathematics", SI Edition 8th Edition, Cengage Learning, 2017.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd., 2017.
3. S. S. Sastry, "Introductory methods of Numerical solutions", 4th Edition , Prentice Hall of India.
4. Erwin Kreyszig , "Advanced Engineering Mathematics", John Wiley Publications, 1999.
5. R.K.Jain&S.R.K.Iyengar, "Numerical Methods" , New Age International (P) Limited
6. James F. Epperson Mathematical Reviews "An Introduction To Numerical Methods And Analysis" Second Edition, Wiley;
https://perhuaman.files.wordpress.com/2014/07/metodos-numericos.pdf

Universal Human Values and Professional Ethics

BVE301 / BVE401/	L	T	P	C
BVE301H / BVE401H	2	1	0	3

Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content, and process of value education.

2. To help students initiate a process of dialog within themselves to know what they really want to be in their life and profession

3. To help students understand the meaning of happiness and prosperity for a human being.

4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.

5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcome:

On completion of this course, the students will be able to

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content, and process of value education, explore the meaning of happiness and prosperity, and do a correct appraisal of the current scenario in the society

2. Distinguish between the Self and the Body, and understand the meaning of Harmony in the Self and the Co-existence of Self and Body.

3. Understand the value of harmonious relationships based on trust, respect, and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society

4. Understand the harmony in nature and existence, and workout their mutually fulfilling participation in nature.

5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Catalogue Description

Every human being has two sets of questions to answer for his life: a) what to do? and, b) how to do? The first set pertains to the value domain, and the other to the skill domain. Both are complimentary, but the value domain has a higher priority. Today, education has become more and more skill-biased, and hence, the basic aspiration of a human being, that is to live with

happiness and prosperity, gets defeated, inspite of abundant technological progress. This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their lives and professions, enabling them to lead an ethical life. In this course, the students learn the process of self-exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, the comprehensive human goal in society, the mutual fulfillment in nature, and the co-existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

UNIT-1   Introduction to Value Education

Understanding the need, basic guidelines, content, and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation –as the mechanism for self-exploration, Continuous Happiness, and Prosperity-A look at basic Human Aspirations, Right understanding, Relationship, and Physical Facilities-the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-2   Understanding Harmony in the Human Being

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, the meaning of Prosperity in detail,   Programs to ensure Sanyam and Swasthya.

UNIT-3   Understanding Harmony in the Family and Society

Harmony in Human-Human Relationship Understanding harmony in the Family-the basic unit of human interaction, Understanding values in the human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect(Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in a relationship, Understanding the harmony in the society (society being an extension of the family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society-Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) – from family to world family!.

UNIT-4   Understanding Harmony in Nature and Existence

Whole existence as Co-existence Understanding the harmony in Nature, Inter connectedness, and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

UNIT-5 Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies, and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for the transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b)At the level of society: as mutually enriching institutions and organizations.

Text Book

1. R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.

References

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, Oxford University Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Mode of Evaluation:

Based on participation of student in classroom discussions/Self-assessment/Peer assessment/Assignments/ Seminar/Continuous Assessment Test/Semester End Exam Socially relevant project/Group Activities/Assignments may be given importance in this course

Guidelines and Content for Practice Sessions

After every two lectures, there will be a one/two-hour practice session. This is meant to provide an opportunity to the students for carrying out self-exploration on the salient propositions made during the lectures. It is to clarify the concepts being introduced and connect them to their everyday life. Further it will also be utilized to make them evaluate their propensities and pre-conditionings vis-à-vis their 'natural acceptance' using examples and issues relevant to them in their day-to-day life situations. Keeping this objective in mind, the following exercises are being proposed for the practice sessions. These are sequentially arranged according to the lecture material. With each of these exercises, the expected outcome is also indicated to facilitate the teacher.

In the text-book, a larger set of practice exercises for self-exploration are given after each chapter, particularly in part 2, of test your understanding. A list of such exercises and the experiences of some of the students and teachers who have done these exercises is also available on the web-site. The teacher may select exercises from this set as well as develop appropriate exercises on their own. Ultimately, it is the teacher who has to use his/ her own creativity to make the best use of these sessions to guide the students towards the expected outcome.

Practice Sessions for Module 1 – Introduction to Value Education

PS 1
Introduce yourself in detail:
•   Share about yourself, your family and your friends.
•   Share salient achievements and failures in your life.
•   Share how do you presently differentiate between right and wrong.
•   Share your aspirations from life. Share what a fulfilling life means for you. For this, you may list out the top five points that occur to you when you think of a fulfilling life. While making the list, please consider your entire life, not just the present stage of your life (youth, middle age, old age, etc.). How do you expect to fulfil these aspirations and live a life of fulfillment?
What are your observations and conclusions from your life experiences so far?

Expected Outcome: The students start exploring themselves; get comfortable with each other and with the teacher and start appreciating the need and relevance of the course.

PS 2

1. Watch the video "Story of Stuff". It is a documentary about the materials economy – its motivation, process and outcome. It has been produced by a set of concerned people at storyofstuff.org, USA (source: http://storyofstuff.org/movies/story-of-stuff/). Discuss

a. The activities and efforts made by the people shown in the video
b. The outcomes of these efforts
c. How their activities are motivated by their notion of happiness (physical facility = happiness. More shopping, physical facility = more happiness)? Is this and any other notions of happiness their own notions or they are programmed by advertisements, others? Does this notion seem to be true or is it getting the people into the loop of more and more physical facility only?
d. Do reflect on your own notion of happiness – is it your own notion or is it borrowed from others?

2. Make a list of your desires. Now for each item on the list, find out what would be necessary to fulfil it, i.e. will it require:

a. Right understanding?
b. Relationship (right feeling)?
c. Physical facility?

Desire Fulfilled by

	Right understanding	Fulfilment in relationship	Physical facility
Good health	?	?	Yes (food etc.)
Lots of friends	?	Yes	?
Other desires… (we have just put some examples above to start your list)			
Your priority	1, 2 or 3?	1, 2 or 3?	1, 2 or 3?

If it requires more than one of these, mark which one is the higher priority. Explain your conclusion from this exercise.

• Can all your aspirations be fulfilled just by physical facility?
• Is right understanding required for the fulfilment of none, some or all of your aspirations?
• Is relationship required for the fulfilment of none, some or all of your aspirations?
• Can one be substituted for the other (e.g. can right understanding be substituted by physical facility). If they are distinct things, what are their key characteristics (or what are the key differences between right understanding, relationship and physical facility)?
• What is the priority order of these three?
• In your education, should all three be included? To put it another way, should your education be only about skills or should it be about skills that are guided by human values?
• The problems that you see around you – are they more due to lack of physical facility or more due to lack of right understanding and right feeling?

Keep this list handy, because we intend to use the same list in future practice sessions as well.

Expected Outcome: The students start finding that right understanding is the basic need of human being; followed by relationship and physical facility. Understanding about all these three needs to be included in education. In fact, technical education without inculcation of human values can generate more problems than solutions. They appreciate the need to understand happiness and make a programme for it. They also start feeling that lack of understanding of

human values is the root cause of all problems and the sustained solution could emerge only through understanding of human values and value-based living.

PS3

1.   Observe that you have the faculty of 'Natural Acceptance', based on which you can verify what is right or what is not right for you. Of course, you may or may not be generally referring to your natural acceptance for making decisions. So, find out if you get a spontaneous answer when you ask yourself basic questions, like the ones mentioned below:

a.   You want to live in relationship (harmony) with others or You want to live in opposition with others?

b.   In relationship, you want to live with the feeling of respect or disrespect (for yourself and for others)?

c.   You want to nurture others or to exploit others?

Is your living in accordance with your natural acceptance or different from it? How do you feel when your living is in accordance with your natural acceptance; and when it is in contradiction to your natural acceptance?

2.   Make a list of the problems in your family. For each problem, find out the most significant reason: is it related to lack of right understanding, lack of feelings in relationship or lack of physical facility? Also find out how much time and effort you have devoted for each in the last one week.

Expected Outcome: The students are able to see that self-verification on the basis of their natural acceptance (and experiential validation through living) is an effective way to verify what is right and what is wrong for them. They are able to see that, in many cases, their actual living is not in accordance with their natural acceptance. They are able to see that they are uncomfortable when their living is in contradiction with their natural acceptance; they are comfortable when they are living in accordance with their natural acceptance.

The students are able to see that, in most of the cases, lack of feeling in relationship is the major cause of problems in their family and with friends rather than the lack of physical facility. However, most persons give higher priority to physical facility in their life, giving a lower priority to or even ignoring relationship. They are so far not aware that right understanding, and right feeling on the basis of right understanding, is the primary need of human being.

Practice Sessions for Module 2 – Harmony in the Human Being

PS 4

1.   Take the list of desires you made in PS2. Update it if required. Now classify the desires as being related to the need of the Self or need of the Body. If a desire appears to be related to both (needs of the Self and needs of the Body), look for the purpose, and split it into two or more sub-desires until you are able to see clearly whether the sub-desire is related to the need of the Self or the need of the Body.

From this exercise,

a)   Find out at least two key distinguishing features between the needs of the Self and the needs of the Body.

b) Roughly what percentage of your desires is related to the needs of the Self and what percentage is related to the needs of the Body?

2. Make a list of your activities from morning till night. Some of these are activities going on in you (the Self), some activities are going on in your Body and some activities involve both you (the Self) as well as your Body. Classify the list of activities in these three categories (see table, below).

Activity	In the Self	In the Body	Involving both the Self and the Body
Running		I made the decision to run. The Body is running	
Eating		I made the decision to eat. The Body is eating. The Body is getting the nutrition and I am getting the taste	
Thinking	I am thinking. My body is not involved		
Feeling excited	I am feeling excited	There is some effect on my Body also	Both, me and my Body is involved
Heartbeat		This is happening in the Body	
Blood circulation		This is happening in the Body	
Other activities…			

Write down your observations regarding:

a) The activities of the Self which do not involve the Body. Can you see that these activities are continuous?

b) Activities of the Body. Can you see that they involve some internal organs of the Body (like the heart and blood vessels)? Can you see that these activities are discontinuous or cyclic?

c) Activities that involve both, the Self as well as the Body (like climbing a staircase). In such activities, try to identify the role of the sense organs as well as the work organs.

Expected Outcome: The students are able to relate their desires to need of the Self and the Body distinctly. They are able to see that the Self and the Body are two distinct realities, and a large part of their desires are related to the need of the Self (and not the Body). They may also be able to conclude that while their efforts are mostly centered on physical facility, which can only fulfil the needs pertaining to the Body and not the Self. They may also see that they are going by the assumption that physical facility will fulfil the needs of the Self also.

The students are able to see that the Self and the Body are two distinct realities and there are three distinct types of activities going on – activities of the Self, activities of the Body and activities of the Body in which the decision of Self is involved. They are able to see that activities like understanding, desire, thought and selection are the activities of the Self; the activities like breathing, palpitation, blood circulation etc. are fully the activities of the Body, while the activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs etc. are such activities that require the participation of both the Self and the Body.

PS5

1. It was mentioned that when you are consuming any physical facility, the following sequence applies:

Tasty-Necessary □ Tasty-Unnecessary □ Tasteless-Unnecessary □ Intolerable

Observe this sequence for at least five types of physical facility, say a tasty food, TV programs, your favourite music, etc.

In contrast, observe that any feeling in you is either naturally acceptable or not. If a feeling is naturally acceptable, you want it continuously; and if not naturally acceptable, you do not want it even for a moment.

What are your conclusions from this exercise? Is continuous happiness possible through sensation by consuming physical facility? What are the other options for continuity of happiness?

2.   Observe your imagination for about 15 minutes. List down the object of your imagination at least once every minute. From this list or from directly observing your imagination, make a sequence diagram (as shown below).

Now write down your observations:

a.   Are you able to see your imagination all of the time or only some of the time?

b.   If you are able to see (be aware of) your imagination only some of the time, what do you think is the reason?

c.   Are all your imaginations well connected (one imagination leads logically to another imagination) or are there sudden changes from one subject to another subject or there are gaps in between one imagination and another imagination? What is the reason for this state of imagination?

d.   What are your observations from this exercise?

3.   Take your list of desires. Revise it if you need to. For each desire, identify the primary source of motivation (sensation, preconditioning or natural acceptance). If there is any desire which has more than one source of motivation, split it into two or more desires. E.g. a desire for good clothes may be motivated by your natural acceptance (to protect the Body from excessive heat or cold) and also be motivated by the social preconditioning for the clothes of the latest fashion. In such a case, split the desire into two desires. Now, write down your observations:

e.   What percentage (approximately) of your desires is motivated by your natural acceptance? This will give you an idea of the percentage that you are self-organised. Keep in mind that natural acceptance is about purpose and it does not change with time, place or person.

f.   What percentage (approximately) of your desires is motivated by sensation or preconditioning? Now you can get an idea of the percentage that you are dependent or enslaved.

g.   What effort is necessary to be completely self-organised (if that is your goal)?

Expected Outcome: The students are able to see that all physical facility they use is required for a limited time in a limited quantity. Sensation through physical facility cannot be the source of continuous happiness. They are able to see that in case of feelings; they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable even for a single moment.

The students become aware of the activities of the Self and start finding their focus of attention at different moments. Also, they are able to see that many of their desires are coming from outside (through preconditioning or sensations) and are not based on their natural acceptance. They are able to find out their level of self-organisation and enslavement.

PS6

1. In the last 3 years, recall the times that your body has been ill (in disharmony). What steps were taken to restore the harmony of the Body?

Date(s)Illness or disharmony Type (Accident, viral infection, bacterial infection, lifestyle related disorder, any other)   Steps taken   Root Cause

If you were to take full responsibility for your body (i.e. you had the feeling of self-regulation), what kind of daily schedule would you have? Approximately how much time would you allocate for keeping your body in good health through:

•   Healthy intake (food, air, water, sunlight, etc.)
•   Timings for upkeep of the Body (sleeping and waking up time, excretion, bathing, etc.)
•   Labour (production of physical facility)
•   Exercise
•   Balancing internal and external organs of body
•   Regulating breathing of body
•   Medicine
•   Treatment

(Of course, you need to keep adequate time for studying, understanding, learning, behaviour, work etc.)

Do you think this schedule will make you more productive or less productive? What conclusions do you draw from this exercise?

2. Calculate the quantity required for a specific physical facility, say clothes, in your family. Now find out the quantity available. Is the quantity available less, equal or more than the quantity required? In that sense, do you feel prosperous or deprived (at least regarding that particular physical facility)? Do the same for other needs. For that you can make an inventory of everything in your home (or at least your room). How much of the physical facility is being rightly utilised? Discuss this with your family and work out your conclusions regarding:

a.   Meaning of prosperity
b.   The role of understanding (human being, the role of physical facility and the feeling of self-regulation)
c.   Ability of your family to identify its needs, with the required quantity

Expected Outcome: The students are able to list down activities related to proper upkeep of the Body and practice them in their daily routine. They are also able to appreciate the plants growing in and around the campus which can be beneficial in maintaining their health and even curing common ailments.

The students begin to recognise that the need for physical facility for nurturing, protection and right utilization of their body is limited in quantity. In cases where they are able to see that they have more than enough physical facility, they develop a feeling of prosperity. In cases of lack in physical facility, they start thinking about how to produce more than required physical facility by way of a mutually-enriching cyclic process (rather than through exploitation).

Practice Sessions for Module 3 – Harmony in the Family and Society

PS 7

1.	Make a list of your family members and friends. Take the eight questions regarding evaluation of trust and reflect on the answers for each person in your list, one person at a time. First reflect on the four questions about natural acceptance (intention):

1a. I want to make myself happy.

2a. I want to make the other happy.

3a. The other wants to make herself/himself happy.

4a. The other wants to make me happy.

Next, reflect on the four questions about competence – your competence and their competence:

1b. I am always able to make myself happy

2b. I am always able to make the other happy

3b. The other is always able to make herself/himself happy

4b. The other is always able to make me happy

From this reflection, how many people are there with whom you have a feeling of trust on intention? Is the feeling unconditional and continuous? The indicators of unconditional, continuous trust on intention are:

•	You never get irritated or angry with them

•	You never have a feeling of opposition for them

•	You are always thinking and making effort for their development

Now in your class group, share your findings and discuss:

•	What you have understood about intention and competence – do you evaluate them separately?

•	How you evaluate yourself and how you evaluate others – do you evaluate yourself on the basis of your intention and evaluate others on the basis of their competence?

•	What is the result of such evaluation?

•	What would be the result if you evaluated the intention and competence separately? Will it lead to a feeling of trust for each other?

•	Reflect on some instances where you got irritated or angry with someone. What was the result of it? Can you recollect that you had a doubt on their intention? Try to call them and share your reflections with one or more of them.

Write down your conclusions from this exercise.

2.	Show the video "Right Here Right Now". It is a short film directed by Anand Gandhi about human behaviour and its propagation.

	(Source: Part 1: https://www.youtube.com/watch?v=OVAokeqQuFM

		Part 2: https://www.youtube.com/watch?v=gIYJePEnvUY).

Discuss:

a.	Specific interactions shown in the video – are these interactions showing reaction or response?

b.	Reflect on your own interactions – what percentage of your interactions are reactions and what percentage are response?

c.	Is it desirable to have 100% response (and no reaction)? What effort is required for it?

Expected Outcome: The students are able to see that the natural acceptance (intention) of everyone is to be happy and make others happy! It is the competence that is lacking – it is lacking in themselves and it is lacking in others also.

Whenever they evaluate themselves on the basis of their intention and others on the basis of their competence, whenever they doubt the intention of the other, there is a feeling of opposition, irritation or anger. They conclude that I am a good person and other is a bad person! This is a major problem in their relationship with their family and friends.

As soon as they are able to see their own natural acceptance (intention), they are able to see that the other also has the same natural acceptance (intention), they have a feeling of being related and they start thinking in terms of mutual development. This is relieving for them and also relieving for the other.

They are able to distinguish between reaction and response; appreciate the need for 100% response in human-human interaction and make effort towards it.

PS 8

1.   List out ten or more of your interactions with other people in your family and friends in the last one week. Now analyse these interactions:

a.   From your side, was it over-evaluation, under/ otherwise evaluation or right evaluation of the other? In each interaction, were you comfortable within, uncomfortable within or unaware of your state?

b.   Did they evaluate you rightly or they over evaluated or under/ otherwise evaluated you? In each interaction, were you comfortable within, uncomfortable within or unaware of your state?

2.   Study the chart regarding differentiation (discrimination) and regarding respect (on the basis of the Self). Where has most of your effort been? Where would you like to put in your effort now? What effort, if any, is required from your side now?

Expected Outcome: The students are able to see that respect is the right evaluation (of intention and competence). Only right evaluation leads to fulfillment in relationship. Over evaluation leads to ego and under/ otherwise evaluation leads to depression.

They are able to see that many present-day problems in the family and society are side-effects of the lack of correct understanding of respect. This results into differentiation (discrimination) such as gender bias, generation gap, caste conflicts, class struggle, domination through power, communal violence, clash of interests, and so on.

Once they can see beyond the superficial differences at the level of body, physical facility, beliefs etc., they are able to see that the other is like me (at the level of the Self):
•   The other has the same natural acceptance as me.
•   The other has the same potential as me.
•   The other has the same programme for happiness as me.

PS 9

1.   What are your personal goals or values that you would like to make effort for? Discuss with your family and find out the goals of other members. Is there a common family goal? What are the goals being pursued by your workplace or educational institution? How much of these three sets of goals are aligned to each other? What is your role in the fulfilment of these three sets of goals?

2.   Assuming that you would like to see your hostel/ educational institution/ workplace/ neighborhood as a model of human society, write down:

      a.   Its goal(s) – relate it to the four human goals and elaborate on what each goal means. Also develop some key indicators or measures which will show that the goals are realised

      b.   The system to achieve these goals – Make a comprehensive plan for the fulfilment of each goal. Relate it to the dimensions of human order.

3.   Working on the dimension of Education-Sanskar and Sanyam-Health, suggest what programs can be taken up to ensure right nutrition of the child along with the right sanskar.

Expected Outcome: The students are able to see that as a family, a society, the comprehensive human goal is naturally acceptable:

•   Right understanding and right feeling in every human being
•   Prosperity in every family
•   Fearlessness (trust) in society
•   Co-existence (mutual fulfilment) in nature/existence

They are able to see that the systems required for their fulfilment include:

Education-Sanskar, Health-Self regulation, Production-Work, Justice-Preservation and Exchange-Storage.

Meaningful participation by every individual, every family, every family cluster… every village, town, city… country and the whole world is required in these systems for the human goals to be fulfilled.

They are also able to see that presently they do not have definite goals and their family goals are unknown or not clearly defined. The goals of their educational institution or workplace are articulated as vision-mission-goals-objectives-values etc. These various goals need to be aligned for them to appreciate, commit and fully participate in their fulfilment. Presently there is neither clarity nor alignment, so there is limited focused effort. They start to refine their goals and think about how to discuss them in their family, in their hostel, institution etc. and make more focused effort.

Practice Sessions for Module 4 – Harmony in the Nature (Existence)

PS 10

1.   Watch the video "An Inconvenient Truth". It is a 2006 documentary about global climate change presented by Former US Vice President Al Gore. He raises the question "What were you doing when you had the time to do something?" (Source: http://an-inconvenient-truth.com/). Discuss:

a.   State of the planet
b.   Root cause of the problems
c.   Comprehensive solution for the problems and your specific part in it

Take any one environmental issue in your neighbourhood/ village/ country and try to find out the root cause of it. [for instance, water scarcity, air pollution, food adulteration, etc.]. What exactly can you contribute as an individual, class or institution to the solution?

2.   Observe the activity, innateness, natural characteristic and inheritance of at least two units in each of the four orders. Are you able to see that these orders are in a relationship of mutual fulfilment?

Expected Outcome: The students are able to appreciate the interconnectedness, interdependence and the relationship of mutual fulfilment existing in nature. They are able to see that they have a natural acceptance to participate in a mutually fulfilling manner in nature. By understanding the activity, innateness, natural characteristic and inheritance of the four orders in nature, they are able to identify the role of human being in the entire nature.

They are able to see that the present-day environmental issues are related to lack of understanding; and these issues can be resolved only with the development of right understanding on the part of human being.

PS 11

1.   Observe your Self.

Are you in space?

Are you getting energy from the body? Is your energy dependent on the body? When your body is sick, does your energy to think diminish? Are you energised in space?

Are you being dictated by the body? Are you self-organised in space?

Innately, you have a natural acceptance for co-existence, harmony and relationship. To understand and live in co-existence, harmony and relationship is the scope of your full potential, your full possibility as a human being. Find out if that is the case for you.

2. Make a chart for the whole existence. List down different courses of studies and relate them to different realities in the existence (such as plants, human mind, animals etc.).

Expected Outcome: The students are able to obtain a holistic vision about the existence. It is in the form of co-existence, rather than a chaos. Every unit is energized, self-organised and is participating with other units in an orderly manner for mutual-fulfilment. It is only the human being without right understanding that is violating this underlying co-existence. They are able to appreciate the need to understand the co-existence in existence.

In the light of this understanding, they are able to place various educational inputs appropriately and see that education is, after all, to understand the underlying harmony and live in harmony at every level – at the level of individual human being, at the level of family, at the level of society and at the level of nature/existence.

Practice Sessions for Module 5 – Implications of the Holistic Understanding – a Look at Professional Ethics

PS 12

1.   Watch the video "Hiware Bazaar". It is a documentary about a progressive village in Maharashtra, India about how good governance, along with the people of the village have made

significant change in their society (Source: https://www.youtube.com/watch?v=cb0Qvh9BJ0s). Discuss:

a.   The goal of this village and the systems that they have to fulfil these goals

b.   The outcomes – achievements and areas of improvement

You can additionally pick current social problems in the campus or neighboring community and discuss how they can be solved with the involvement of the students and teachers.

2.   Recollect any situation in your life when you had to face a strong ethical dilemma. Explain how, with the help of proper self-exploration and understanding, the dilemma could be resolved.

Expected Outcome: The students are able to clearly visualise the co-relation between lack of Human Values and the prevailing problems. They are also able to visualise tangible steps and a roadmap for moving in the cherished direction – for a humane society.

PS 13

1.   By careful analysis, identify some important features which, when incorporated, will make our education more humanistic. What are the right expectations in terms of the outcome from humanistic education?

2.   Some people feel that talking about holistic development is like trying to turn the wheel of time backwards. It will greatly hamper our progress. What is your view in this regard? Explain with justification.

Expected Outcome: The students are able to detail out various social systems essential for their own fulfilment, as well as the fulfilment of future generations. In particular, they are able to visualize the education system required for individual, and then societal transformation.

They are also able to appreciate those many efforts made in the tradition that were in line with desirable human goals. Thus, they are able to learn from tradition and develop a deep sense of gratitude for the effort, for the people, for the tradition, culture etc.

PS 14

1.   Suggest ways in which you can use your knowledge of Technology/Engineering/ Management/Medicine etc. for universal human order, from your family order to the world family order.

2.   The course is going to be over now. Evaluate your state before and after the course in terms of

a. Thought   b. Behaviour   c. Work   d. Realization

3.   Do you have any plan to participate in the transition for the humane society after graduating from the institute? Write a brief note on it.

Expected Outcome: The students are able to visualise an appropriate utilization of the knowledge in their respective streams to ensure mutually enriching and sustainable systems. They are able to sincerely evaluate the course and the transformation achieved in this process. They are also able to make use of this understanding for moving towards a happy and prosperous life, including an ethical conduct of their profession.

Socially Relevant Projects

Projects may be chosen to develop all the three aspects, in order of priority:
•   Right understanding
•   Relationship (right feeling and right thought)
•   Skills for living in harmony

For illustration, let us take a project of tree plantation. It should help the teacher and students to:
1.   Experience and understand mutual fulfillment in nature.
2.   Understand human participation in enrichment, protection and right utilization of rest of the nature as well as to get a feel for prosperity within. i.e. get an idea of
a.   Right utilization of the products from the tree (like fruit, vegetables, wood etc.)
b.   Protection and nurturing of the trees planted; at least to be aware not to damage existing trees while planting the new ones.
3.   Planning and Physical plantation of the tree.

The tree plantation project can be helpful in developing the three aspects mentioned. Of course, if they are doing tree plantation primarily as a task to be done or a means to get attention and some press coverage, then the project with the same physical tasks will not be as productive for this course.

Projects should take into consideration local requirements – it should be socially relevant. For instance, a gasifier power generation project in a city can use the waste wood, leaves, cardboard and paper etc. and contribute the clean power in the neighborhood power grid using a net-meter.

Projects can be of three types:
1.   Study – Observing/Recognizing/Survey/Proposing a solution. e.g. finding out the change in water table in the local area and potential sustainable solutions
2.   Modelling / Prototyping – Analysing, doing on a small scale and for a short term. e.g. developing a prototype of a pedal driven generator
3.   Implementation – on some scale and for the long term. e.g. establishing an evening school in the local community, solar based lighting and pumping in the village community

Some topics:
1.   Find out the quantity of food-grain (rice, wheat, corn, jowar etc.) that your family consumes annually. Taking this as the base, find out the total requirement of food-grain for your country. Find out the total production of food-grain in your country. Is the production sufficient? Articulate your conclusions
2.   What do we consider important as a family -understanding, relationship and/ or physical facility? Is our time and effort applied for what we consider important? What do we evaluate at the end of every month? Discuss this at home and articulate your conclusions
3.   Does my family have sufficient physical facility for my physical needs? Is my family prosperous? What do we need for feeling prosperous? Discuss this at home and articulate your conclusions
4.   For the proper development of a child, there is a need to ensure a proper system in the society and make an appraisal of the current state. As a project work, find out the following in the society regarding the nutrition of children:
     a.   The demographic divide
     b.   Present social determinant of Health

       c.   Current child Health Policies

       d.   Involvement of Society and steps to be taken in this direction

Suggest policies which would ensure a better state of the society in terms of the above.

5.   Find out how much water is available (rain, rivers, canals), how much water is needed

6.   Find out how much water is available annually, and how much is used to generate electricity

7.   Find out about power generation from low-head flowing-water, i.e. without making any dams. Can this system be cyclic and mutually-enriching?

8.   Find out the change in water table in the local area and suggest possible sustainable solutions

9.   List Socially Relevant Work in your state, nearby states, whole country, nearby countries, whole world

10.   What is one valuable lesson from your tradition? Study its impact on Trust in your family

11.   Document your understanding of the meaning of Health of your Body and the Programme for Health

12.   Study the needs of families around your campus that are selling liquor. Suggest ways that they can meet their needs in a mutually fulfilling manner, rather than taking to means that are harmful for the society

13.   Study the 'Sulabh-Shauchalaya' organisation and systems. Write a case study report on it with sections on its eco-friendly sustainable technology and human-friendly entrepreneurial system

B.Tech 2nd Year Common Courses

(Effective from session 2023-24)

- **BCC301 / BCC401/ BCC301H / BCC401H: Cyber Security**
- **BCC302 / BCC402/ BCC302H / BCC402H : Python programming**

BCC301 / BCC401/ BCC301H / BCC401H:
CYBER SECURITY

Course Outcome (CO)	Bloom's Knowledge Level (KL)
At the end of course , the student will be able to	
CO 1	Understand the basic concepts of cyber security and cybercrimes.	K_1, K_2
CO 2	Understand the security policies and cyber laws.	K_1, K_2
CO 3	Understand the tools and methods used in cyber crime	K_2
CO 4	Understand the concepts of cyber forensics	K_1, K_2
CO 5	Understand the cyber security policies and cyber laws	K_2

DETAILED SYLLABUS

Unit	Topic	Lecture
I	**INTRODUCTION TO CYBER CRIME :** Cybercrime- Definition and Origins of the word Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyber offenses: How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector.	04
II	**CYBER CRIME :** Mobile and Wireless Devices-Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era.	04
III	**TOOLS AND METHODS USED IN CYBERCRIME :** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS At-tacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction to Phishing, Identity Theft (ID Theft).	04
IV	**UNDERSTANDING COMPUTER FORENSICS:** Introduction, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation. Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics.	04
V	**INTRODUCTION TO SECURITY POLICIES AND CYBER LAWS :** Need for An Information Security Policy, Introduction to Indian Cyber Law, Objective and Scope of the Digital Personal Data Protection Act 2023, Intellectual Property Issues, Overview of Intellectual Property Related	04

	Legislation in India, Patent, Copyright, Trademarks.	

Text books:
1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, Publish Date 2013.
2. Basta, Basta, Brown, Kumar, Cyber Security and Cyber Laws, 1st edition , Cengage Learning publication
3. Dr. Surya PrakashTripathi, RitendraGoyal, Praveen Kumar Shukla, KLSI. "Introduction to information security and cyber laws". Dreamtech Press. ISBN: 9789351194736, 2015.
4. Cyber Security and Date Privacy by Krishan Kumar Goyal , Amit Garg , Saurabh Singhal , HP HAMILTON LIMITED Publication, ISBN-13-978-1913936020
5. Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing
6. Investigating Intrusions", Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 978 - 1-118 -84965 -1.
7. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, 15-Dec 2010.
8. Anti- Hacker Tool Kit (Indian Edition) by Mike Shema, McGraw-Hill Publication.