

DR. A.P.J. ABDUL KALAM TECHNICALUNIVERSITY, LUCKNOW



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

- **ELECTRONICS ENGINEERING**
- **ELECTRONICS AND COMMUNICATION ENGINEERING**
- **ELECTRONICS AND TELECOMMUNICATION ENGINEERING**
- **ELECTRONICS AND INSTRUMENTATION ENGINEERING**
- **INSTRUMENTATION AND CONTROL ENGINEERING**
- **APPLIED ELECTRONICS AND INSTRUMENTATION**
- **INSTRUMENTATION ENGINEERING**

[Effective from the Session: 2023-2024]

DR. A.P.J. ABDUL KALAM TECHNICALUNIVERSITY, LUCKNOW

SEMESTER –IV

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				
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	BEC401	Communication Engineering	T	PC	3	1	0	20	10	30	70	100	4
4	BEC402	Analog Circuits	T	PC	3	1	0	20	10	30	70	100	4
5	BEC403	Signal System	T	PC	2	1	0	20	10	30	70	100	3
6	BEC451	Communication Engineering Lab	P	PC	0	0	2		50	50	50	100	1
7	BEC452	Analog Circuits Lab	P	PC	0	0	2		50	50	50	100	1
8	BEC453	Signal System 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.

SEMESTER-IV

BEC401	COMMUNICATION ENGINEERING	3L:0T:0P	3 Credits
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Unit	Topics	Lectures
I	Review of signals and systems, frequency domain representation of signals, principles of amplitude modulation systems- DSB, SSB and VSB modulations.	8
II	Angle modulation, representation of FM and PM signals, spectral characteristics of angle modulated signals.	8
III	Review of probability and random process, Gaussian and white noise characteristics, noise in amplitude modulation systems, noise in frequency modulation systems, pre-emphasis and de-emphasis, threshold effect in angle modulation.	8
IV	Pulse modulation, sampling process, pulse amplitude and pulse code modulation (PCM), differential pulse code modulation. Delta modulation, noise considerations in PCM, time division multiplexing, digital multiplexers.	8
V	Digital modulation schemes- phase shift keying, frequency shift keying, quadrature amplitude modulation, continuous phase modulation and minimum shift keying.	8

Text/Reference Books:

1. Haykin S., "Communications Systems," John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering," Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems," Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering," John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication," Kluwer Academic Publishers, 2004.
6. Proakis J.G., "Digital Communications," 4th Edition, McGraw Hill, 2000.
7. Abhay Gandhi, "Analog and Digital Communication," Cengage publication, 2015.

Course Outcomes:

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

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth.
2. Analyze the behavior of a communication system in presence of noise.
3. Investigate pulsed modulation system and analyze their system performance.
4. Investigate various multiplexing techniques.
5. Analyze different digital modulation schemes and compute the bit error performance.

BEC-402	ANALOG CIRCUITS	3L:1T:0P	4 Credits
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Unit	Topics	Lectures
I	Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.	8
II	Frequency response of Amplifiers: High frequency transistor models, frequency response of single stage and multistage amplifiers, cascade amplifier, Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation, concept of stability, gain margin and phase margin.	8
III	Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), Crystal Oscillator.	8
IV	Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load, differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR, Op-Amp design: Design of differential amplifier for a given specification, design of gain stages and output stages, compensation.	8
V	Op-Amp applications: Review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications. Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues.	8

Text/Reference Books:

1. J.V. Wait, L.P. Huelsman and GA Korn, "Introduction to Operational Amplifier theory and applications," Mc Graw Hill, 1992.
2. J. Millman and A. Grabel, "Microelectronics," 2nd edition, McGraw Hill, 1988.
3. P. Horowitz and W. Hill, "The Art of Electronics," 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, "Microelectronic Circuits," Saunder's College Publishing, 4th edition.
5. Paul R. Gray and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits," John Wiley, 3rd edition.
6. Muhammad H. Rashid, "Electronic Devices and Circuits," Cengage publication, 2014.

Course Outcomes:

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

1. Understand and design of the various amplifiers.
2. Understand the concept of feedback topologies.
3. Design the different types of oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.
5. Apply the concept of Operational amplifier to design linear and non-linear applications.

BEC403	SIGNAL SYSTEM	3L:1T:0P	4 Credits
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Unit	Topics	Lectures
I	Signals and systems as seen in everyday life, and in various branches of engineering and science, energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals, system properties: linearity, additivity and homogeneity, shift-invariance, causality, stability, realizability.	8
II	Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input-output behaviour with aperiodic convergent inputs, characterization of causality and stability of linear shift invariant systems, system representation through differential equations and difference equations, Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response	8
III	Fourier series representation, Fourier transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality, Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier transform (DFT), Parseval's Theorem, the idea of signal space and orthogonal bases, the Laplace transform, notion of Eigen functions of LSI systems, a basis of Eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behaviour.	8
IV	The z-Transform for discrete time signals and systems-Eigen functions, region of convergence, z-domain analysis.	8
V	The sampling theorem and its implications- spectra of sampled signals, reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, aliasing and its effects, relation between continuous and discrete time systems.	8

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.

Course outcomes:

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

1. Analyze different types of signals.
2. Analyze linear shift-invariant (LSI) systems.
3. Represent continuous and discrete systems in time and frequency domain using Fourier series and transform.
4. Analyze discrete time signals in z-domain.
5. Study sampling and reconstruction of a signal.

BEC451	COMMUNICATION ENGINEERING LAB	0L:0T:2P	1 Credits
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SUGGESTIVE LIST OF EXPERIMENTS

1. To study DSB/ SSB amplitude modulation & determine its modulation factor & power in side bands.
2. To study amplitude demodulation by linear diode detector.
3. To study frequency modulation and determine its modulation factor.
4. To study sampling and reconstruction of pulse amplitude modulation system.
5. To study pulse amplitude modulation.
 - a) Using switching method
 - b) By sample and hold circuit
6. To demodulate the obtained PAM signal by 2nd order LPF.
7. To study pulse width modulation and pulse position modulation.
8. To study pulse code modulation and demodulation technique.
9. To study delta modulation and demodulation technique.
10. To construct a square wave with the help of fundamental frequency and its harmonic component.
11. Study of amplitude shift keying modulator and demodulator.
12. Study of frequency shift keying modulator and demodulator.
13. Study of phase shift keying modulator and demodulator.
14. Study of single bit error detection and correction using hamming code.
15. Study of quadrature phase shift keying modulator and demodulator.
16. To simulate differential phase shift keying technique using MATLAB software.
17. To simulate M-ary Phase shift keying technique using MATLAB software (8PSK,16PSK) and perform BER calculations.
18. Design a front end BPSK modulator and demodulator.

Course Outcomes:

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

1. Analyze and compare different analog modulation schemes for their modulation factor and power.
 2. Study pulse amplitude modulation.
 3. Analyze different digital modulation schemes and can compute the bit error performance.
 4. Study and simulate the Phase shift keying.
 5. Design a front end BPSK modulator and demodulator.
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BEC452	ANALOG CIRCUIT LAB	0L:0T:2P	1 Credits
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SUGGESTIVE LIST OF EXPERIMENTS

1. Characteristic of BJT: Study of BJT in various configurations (such as CE/CS, CB/CG, CC/CD).
2. BJT in CE configuration: Graphical measurement of h-parameters from input and output characteristics, measurement of A_v , A_i , R_o and R_i of CE amplifier with potential divider biasing.
3. Study of Multi-stage amplifiers: Frequency response of single stage and multistage amplifiers.
4. Feedback topologies: Study of voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc.
5. Measurement of Op-Amp parameters: Common mode gain, differential mode gain, CMRR, slew rate.
6. Applications of Op-Amp: Op-Amp as summing amplifier, difference amplifier, integrator and differentiator.
7. Field effect transistors: Single stage common source FET amplifier –plot of gain in dB vs frequency, measurement of bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
8. Oscillators: Study of sinusoidal oscillators- RC oscillators (phase shift, Wien bridge etc.).
9. Study of LC oscillators (Hartley, Colpitt, Clapp etc.),
10. Study of non-sinusoidal oscillators.
11. Simulation of amplifier circuits studied in the lab using any available simulation software and measurement of bandwidth and other parameters with the help of simulation software.
12. ADC/DAC: Design and study of Analog to Digital Converter.
13. Design and study of Digital to Analog Converter.

Course Outcome

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

1. Understand the characteristics of transistors.
 2. Design and analyze various configurations of amplifier circuits.
 3. Design sinusoidal and non-sinusoidal oscillators.
 4. Understand the functioning of OP-AMP and design OP-AMP based circuits.
 5. Design ADC and DAC.
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BEC453	SIGNAL SYSTEM LAB	0L:0T:2P	1 Credits
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SUGGESTIVE LIST OF EXPERIMENTS

1. Introduction to MATLAB
 - a. To define and use variables and functions in MATLAB.
 - b. To define and use Vectors and Matrices in MATLAB.
 - c. To study various MATLAB arithmetic operators and mathematical functions.
 - d. To create and use m-files.
2. Basic plotting of signals
 - a. To study various MATLAB commands for creating two and three dimensional plots.
 - b. Write a MATLAB program to plot the following continuous time and discrete time signals.
 - i. Step Function
 - ii. Impulse Function
 - iii. Exponential Function
 - iv. Ramp Function
 - v. Sine Function
3. Time and Amplitude transformations
Write a MATLAB program to perform amplitude-scaling, time-scaling and time-shifting on a given signal.
4. Convolution of given signals
Write a MATLAB program to obtain linear convolution of the given sequences.
5. Autocorrelation and Cross-correlation
 - a. Write a MATLAB program to compute autocorrelation of a sequence $x(n)$ and verify the property.
 - b. Write a MATLAB program to compute cross-correlation of sequences $x(n)$ and $y(n)$ and verify the property.
6. Fourier Series and Gibbs Phenomenon
 - a. To calculate Fourier series coefficients associated with Square Wave.
 - b. To Sum the first 10 terms and plot the Fourier series as a function of time.
 - c. To Sum the first 50 terms and plot the Fourier series as a function of time.
7. Calculating transforms using MATLAB
 - a. Calculate and plot Fourier transform of a given signal.
 - b. Calculate and plot Z-transform of a given signal.
8. Impulse response and Step response of a given system
 - a. Write a MATLAB program to find the impulse response and step response of a system from its difference equation.
 - b. Compute and plot the response of a given system to a given input.
9. Pole-zero diagram and bode diagram
 - a. Write a MATLAB program to find pole-zero diagram, bode diagram of a given system from the given system function.
 - b. Write a MATLAB program to find, bode diagram of a given system from the given system function.
10. Frequency response of a system
Write a MATLAB program to plot magnitude and phase response of a given system.
11. Checking linearity/non-linearity of a system using SIMULINK
 - a. Build a system that amplifies a sine wave by a factor of two.
 - b. Test the linearity of this system using SIMULINK.

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 of method 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 Transform to 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, Poisson 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/ BVE301H / BVE401H	L	T	P	C
	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, Sahastitva 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

- The activities and efforts made by the people shown in the video
- The outcomes of these efforts
- 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?
- 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:

- Right understanding?
- Relationship (right feeling)?
- 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=gIYJePEEnvUY>).

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

<u>BCC301 / BCC401/ BCC301H / BCC401H:</u>		
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

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.