BTECH OTHER THAN BIOTECHNOLOGY / BIOINFORMATICS

COURSE STRUCTURE

PROGRAM OBJECTIVES

PO 1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and engg. specialization to the solution of complex engineering problems.

PO-2 Problem analysis: Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.

PO-3 Design/development of solutions: Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4 Conduct investigations of complex problems: Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9 Individual and team work: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

PO-10 Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

PO-11 Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PO-12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, SOLAN

COURSE CURRICULUM OF BTECH OTHER THAN BT / BI- 2024 Batch

B. TECH 1st SEMESTER

S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	HSS	21B11HS111	English	2	0	0	**2**	**2**
2	Basic Sciences	24B11MA111	Engineering Mathematics -1	3	1	0	**4**	**4**
3	Basic Sciences	18B11PH111	Engineering Physics-I	3	1	0	**4**	**4**
4	Engg Science	24B11CI111	Problem Solving and Programming	3	0	0	**3**	**3**
5	Engg Science	18B17GE171	Workshop Practices **OR**	0	0	3	**1.5**	**3**
6		18B17GE173	Engineering Graphics	0	0	3		**3**
7	Basic Sciences	18B17PH171	Engineering Physics Lab-I	0	0	2	**1**	**2**
8	Engg Science	24B17CI171	Problem Solving and Programming Lab	0	0	2	**1**	**1**
9	HSS	21B17HS171	English Lab	0	0	2	**1**	**2**
10		18B17GE172	Mandatory Induction Program	-	-	-	-	-
11	PR	24B19CI191	Project-I	0	0	2	1	2
						Total	**18.5**	**23**

B. TECH 2nd SEMESTER

S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	Basic Sciences		Engineering Mathematics -II	3	1	0	**4**	**4**
2	Basic Sciences	18B11PH211	Engineering Physics-II	3	0	0	**3**	**3**
3	Basic Sciences	18B11PH271	Engineering Physics Lab – II	0	0	2	**1**	**2**
4	Engg Science		Basic Electrical Engineering	3	1	0	**4**	**4**
5	Engg Science		Basic Electrical Engineering Lab	0	0	2	**1**	**2**
6	Engg Science	18B17GE173	Engineering Graphics **OR**	0	0	3	**1.5**	**3**
7		18B17GE171	Workshop Practices	0	0	3		**3**
8	Engg Science		Data Structures and Algorithms	3	0	0	3	3
9	Engg Science	18B17CI271	Data Structures and Algorithms Lab	0	0	4	**2**	**4**
10	HSS	23B11HS211	Universal Human Values II: Understanding Harmony	2	1	0	**3**	**3**
11	HSS	23B11HS212	Professional Communication Practice	0	0	2	**Audit**	**2**
12	PR		Project	0	0	2	**1**	**2**
						Total	**23.5**	**32**

ENGLISH

COURSE CODE: 21B11HS111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P : 2-0-0

Pre-requisite: None

Course Objectives:

1. The students will be able to analyze different communication situations to make choices about the most effective and efficient ways to communicate.
2. The student will learn to deliver effective presentations in contexts that may require power point, extemporaneous or impromptu oral presentations.
3. The student will learn to write effective technical documents using appropriate style.
4. The student will learn to design effective resumes, and write effective emails, letters and reports
5. Students will develop command over their language and synchronize their thoughts into written form

Course Outcomes:

SNo	Course Outcomes	Level of Attainment
CO-1	Understand and learn the concepts of better and effective communication	Familiarity
CO-2	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Assessment and Usage
CO-3	Help make communication better by learning the nature and mechanics of effective writing	Assessment and Usage
CO-4	Design effective resumes, and write effective emails, letters and reports	Usage
CO-5	Understand different workplace scenarios and communicate accordingly in diverse communicative situations	Assessment and Usage

Course Contents:

	Contents	Lectures required
1	**Workplace Communication: Meaning and Importance** • Importance of communicating effectively: Theories of communication • Understanding interpersonal Communication: The Johari Window Model • Stages of communication: Ideation, encoding, transmission, decoding & response • Feedback in organizations • Barriers to effective communication: Physical, Social, Psychological, Cultural, Language & organizational • Guidelines to overcome communication barriers	6
2	**Listening Skills & Nonverbal Communication and Body Language** **Listening** • Empathetic Listening and its importance in leadership communication • Process and Principles of Listening • Types of Listening • Barriers to listening **Nonverbal Communication** • Nonverbal communication and body language defined • Functions of nonverbal communication and Body Language: Conveying meanings, expressing emotion, presenting self, managing interactions, defining relationship • Nonverbal Communication Codes: Communicating through Body Movements, Voice, Touch, Personal Space, Time, Physical Appearance	6
3	**Intercultural Communication: An Introduction** • Intercultural Communication in a globalized world • Language, Communication, and Culture • Nonverbal Communication and Culture • Intercultural Communication Competence	3
4	**Effective Presentation Skills** • Planning Presentations • Making PowerPoint presentations • Pre- presentation jitters • Preparation and Practice • Delivering the Presentation • Handling Questions	5
5	**Communication Strategies & Professional Writing** • Principles of Technical Writing • Writing Process: Pre-writing, writing & post-writing • Neutral, positive, Negative messages and Persuasive messages • Letters, Emails • Resume and Cover Letter **Report Writing** • Functions of a report • Types of reports • Format of the reports • Use of Visuals-Charts, Tables, Pictures	8
	Total lectures	28

***Modified Portions have been Highlighted**

Suggested Text Book(s):

1. M.A. Guffey: *Business Communication: Product & Process*. South-Western College Publishing, 2000.
2. R.V Lesikar, M.E. Flatley, K Rentz, N Pande: *Business communication, 12th Edition,* McGraw Hill, 2009.

Suggested Reference Book(s):

1. Herta A. Murphy, Herbert Hildebrandt, Jane Thomas: *Effective Business Communication*, 7th Edition, Tata Mcgraw Hill, 2017.
2. Karen Schneiter Williams, Joyce P Logan, A.C. Buddy Krizan , Patricia Merrier: *Communicating in Business, Cengage Learning, 1st Edition 2012.*
3. H.S. Mukherjee: *Business Communication-connecting at work*, Oxford University Press, 2nd Edition 2013.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	3	3	3	1	2	3	3	3	3	1	3	2.4
CO-2	1	2	3	2	1	1	2	3	3	3	1	3	2
CO-3	1	1	3	2	2	2	1	2	3	3	1	3	2
CO-4	1	2	2	3	2	1	1	3	2	3	1	3	1.9
CO-5	1	2	3	2	2	2	1	3	2	3	1	3	2
Average	1	2	2.6	2.3	1.6	1.6	1.5	2.8	2.5	3	1	3	2

ENGLISH LAB

COURSE CODE: 21B17HS171

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P : 0-0-2

Pre-requisite: None

Course Objectives:

1. The students will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
2. The students will learn the rules of grammar in writing. It will enhance their ability to use logical sequencing while writing any business letter or document.
3. The students will learn using new words and build their vocabulary steadily and systematically by following lab exercises.
4. Students will develop command over their language and synchronize their thoughts while writing different types and kinds of Business letters.
5. Students will be groomed to develop the art of speaking logically, confidently and pragmatically which involves understanding work ethics and manners and the correct use of body language.

Course Outcomes:

SNo	Course Outcomes	Level of Attainment
CO-1	Understand and sharpen writing skills using correct grammar in Emails, Business letters and Report writing.	Usage and Assessment
CO-2	Help make communication stronger by learning Non verbal cues and correct Body Language.	Familiarity and Assessment
CO-3	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Familiarity and Assessment
CO-4	Develop advanced vocabulary by learning to use different ways of word construction and strategies of learning new words.	Usage and Assessment
CO-5	Learn about the ethics of writing and different types of formats in documents with command over language.	Usage and Assessment

Course Contents:

Unit	Content	Lecture required
1	**Software: Tense Buster** The students will take the 'Test Your Level' Test on the Software and start with the respective Exercise as per the level achieved **Exercises:** Elementary Level: Am, is, are (to be) Pre-Intermediate Level: Comparisons Intermediate Level: The passive Upper Intermediate Level: Present Perfect Advanced Level: Past perfect	1
2	**Software: Tense Buster** **Exercises:** Elementary Level: Simple present Pre-Intermediate Level: Simple present Intermediate Level: Will and going to Upper Intermediate Level: Past continuous Advanced Level: Reported speech	1
3	**Software: Tense Buster** **Exercises:** Elementary Level: Negatives (I don't go) and Questions (does he?) Pre-Intermediate Level: Present continuous Intermediate Level: Question tags Upper Intermediate Level: Adjectives and adverbs Advanced Level: Phrasal verbs	1
4	Software: Tense Buster **Exercises:** Elementary Level: Countable? and Some, any Pre-Intermediate Level: Present perfect Intermediate Level: Equality Upper Intermediate Level: Modal verbs Advanced Level: Nouns	1
5	**Software: Tense Buster Exercises:** Elementary Level: I, my, me, A, an, the Pre-Intermediate Level: Simple past Intermediate Level: Relative clauses Upper Intermediate level: The future Advanced Level: The passive	1
6	**Software: Tense Buster Exercises:** Elementary level: Have got (International English version only) Pre-Intermediate level: Prepositions Intermediate Level: Conditionals Upper Intermediate level: Conditionals Advanced Level: Articles	1
7	**Software: Practical Writing Essays: For and Against** What will I learn? Stages of writing Brainstorming (1) Brainstorming (2) Planning your essay (1) Choosing a style Quick quiz: the Writing Process Lab work: First and Final Draft	1
8	**Software: Practical Writing Essays: Descriptive:** What will I learn?, Planning your essay (1), Planning your essay (2), Words and senses (1), Vocab focus: choosing precise words, Linking ideas (1), Linking ideas (2), Quick quiz: descriptive essays	1

9	**Software: Practical Writing A Short Report Graphs (I):** What will I learn in this unit? A report on graph, Choosing tenses (1), Choosing tenses (2), Write a report (1), Prepositions of time (1), Describing differences (1), Quick quiz: A report on graphs, Lab work: Report writing from graph	**1**
10	**Software: Practical Writing** **A Short Report: Hotel and restaurants (II)**: What will I learn? Restaurant reviews: structure, Vocab: Hotels and restaurants, Topic sentences (1), Mixing sentences (1), Mixing sentences (2), Past or Present?, Write two reviews, Quick quiz: a short report Lab work: Write any one review	**1**
11	**Software: Practical Writing** **Emails I: Asking for Information (I):** What will I learn?, Emails: an overview, Emails: structure, Finding functional language, Asking people to do things, Enquiries and Responses	**1**
12	**Software: Practical Writing** **Emails II: Asking for Information (II):** Functional language for emails, Emails: Correcting mistakes, Write two emails, Vocabulary Focus, Quick quiz: Email basics, Lab work: Write 2 emails	**1**
13	**Software: Practical Writing Official Letters:** What will I learn in this unit? Official letters: layout Official letters: vocabulary Build up an official letter Letters: style. The cover letter: job applications Letters: proofreading Present perfect or simple past? Quick quiz: letters	**1**
14	**Text speak:** What will I learn? Text speak: an overview Text terms (1) Text terms (2) Inviting people to do things Responding appropriately Text speak and speaking Quick quiz: text speak	**1**
Total lectures		**14**

*Modified Portions have been Highlighted

Evaluation Scheme:

S. No	Exam	Marks	Coverage / Scope of Examination
1	P-1	20	Syllabus covered up to T-1
2	P-2	20	Syllabus covered up to T-2
3.	Lab Assignments	10	Entire Syllabus
4.	Tutorial Activities	50	Ongoing evaluation throughout the semester

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	x	x	x	x	x	x	2	1	2	3	x	3	0.92
CO-2	x	x	x	x	x	1	3	2	3	3	x	3	1.25
CO-3	x	x	x	x	x	x	2	3	2	3	x	3	1.08
CO-4	x	x	x	x	x	1	2	1	2	3	x	3	1
CO-5	x	x	x	x	x	1	2	1	2	3	x	3	1
Average	0	0	0	0	0	0.6	2.2	1.6	2.2	3	0	3	1.05

Engineering Mathematics - I

COURSE CODE: 24B11MA111

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P: 3-1-0

Pre-requisites: Basic concepts of calculus and algebra.

Course Objectives:

- To develop the essential tool of matrices and linear algebra in a comprehensive manner.
- To study various techniques of multivariate calculus and integral calculus.
- To understand fundamental concepts of vector calculus.
- To study the fundamentals of Laplace transforms and their applications.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the role of matrices and their properties, solve linear systems of equations and perform diagonalization of matrices, finding eigenvalues and eigenvectors of matrices.	Familiarity
CO-2	Evaluate partial derivatives with its physical significance and expand functions of several variables, find maxima and minima of functions of several variables with / without constraints, find areas and volumes of solids using multiple integration.	Assessment & Usage
CO-3	Understand the calculus of vectors and vector valued functions with their physical significance.	Assessment& Usage
CO-4	Use Laplace transforms and inverse Laplace transforms to solve initial value problems.	Assessment & Usage

Course Contents:

Unit	Contents	Lectures required
1	**Linear Algebra:** Matrices, row echelon form, linear independence and dependence of vectors, rank of a matrix, solution of systems of linear equations, Vector spaces, subspaces, linear span, basis and dimension, eigenvalues and eigenvectors, Cayley Hamilton theorem and its application.	10
2	**Multivariate Calculus:** Limits and continuity of function, partial differentiation, chain rule, total derivative, maxima & minima, double integrals, change of order and change of variables, applications to areas and volumes.	8
3	**Vector Calculus:** Equations to a line and a plane, tangent plane and normal line, gradient, scalar and vector point function, curl and divergence and their physical significance, directional derivatives, line integrals.	8

4	**Laplace Transform: P**roperties of Laplace transform, Linearity, First shifting theorem, multiplication and division by t, transforms of derivatives and integrals, Heaviside unit step function, Dirac's delta function, second shifting theorem, inverse Laplace transform using partial fraction and convolution theorem.	**8**
5	**Numerical Methods:** Numerical solution of algebraic & transcendental equations – bisection & Newton-Raphson method, interpolation, integrations by trapezoidal and Simpson's rule.	**8**
	Total Lectures	**42**

Suggested Text Book (s):

- Jain and Iyengar, Advanced Engineering Mathematics, 5th Edition, Narosa Publishing House.
- Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2023.

Reference Book(s):

- B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.
- Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw Bogacki; Thomas Calculus, 15th Edition, Pearson Education, 2024.
- D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 08 Quizzes (3) - 12 Attendance - 05

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Engineering Mathematics I)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	**1.75**
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.0**
Average	**2**	**2.5**	**2.5**	**2.5**	**2.5**	**1**	**1**	**1**	**2**	**2.25**	**1.5**	**2**	

Engineering Physics-I

COURSE CODE: 18B11PH111

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P : 3-1-0

Pre-requisite: None

Course Objectives:

I. To enable the students to get better understanding about electromagnetics and its applications in engineering.
II. To enable the students to get better understanding about physical optics and its applications in engineering.
III. At the conclusion of the course, the ability of students should have enhanced to think logically about the problems of science and technology and obtain their solutions.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will get better understanding about electromagnetics and its applications in engineering.	Familiarity and Assessment
CO-2	Students will get better understanding about physical optics and its applications in engineering.	Familiarity and Assessment
CO-3	Students will be able to enhance logical thinking about the problems of science and technology	Assessment and Implementation
CO-4	Students will be able to apply learned concepts to obtain solutions to the problems	Assessment and Implementation

Course Contents:

Unit	Contents	Lectures required
1	**Basics of Electromagnetics:** Vector algebra, Electromagnetic Operations (Curl, Divergence, etc), Basics of EM theory, Maxwells equations. EM waves in different mediums (Conducting, Non Conducting). Concept of Poynting Vector and Theorem. Boundary conditions for EM transmissions. Applications of EM theory	**16**

2	**EM to Optics:** Bridge from EM to Wave Optics	**2**
3	**Interference:** Superposition of Waves, Coherence, Concept of Interference (Real and Virtual Sources). Michelson Morley and Fabry–Pérot interferometer and their applications	**12**
4	**Diffraction:** Fraunhofer diffraction by single, double and N slits, Resolving and dispersive power of Diffraction elements. Application of Diffraction (WDM and other applications).	**6**
5	**Polarization:** Introduction, Difference between unpolarized and polarized light, Means of production of polarized light, Optical activity, specific rotation, Lorentz half shade and biquartz polarimeter. Application of Polarizations (Communication and other applications)	**6**
	Total Lectures	**42**

Suggested Text Book(s):

1. David J Griffiths, Introduction to Electrodynamics, Eastern Economy Editions, PHI, 4th edition (2012).
2. Engineering Physics, Shatendra Sharma & Jyotsna Sharma, Pearson Pub. 2018.
3. A Textbook of Optics by N Subrahmanyam et. al and N. Subrahmanyam, 23rd Rev. Edn. 2006 Edition, Kindle Edition.
4. Fitzpatrick, R. "Electromagnetism and Optics (An Introductory Course)", 2017.

Suggested Reference Book(s):

1. Fundamentals of Optics, F.A. Jenkins and H.E. White, McGraw-Hill, Addison-Wesley Press, 1981.
2. Optics, Ajoy Ghatak, Tata McGraw Hill, 5th addition, 2012.
3. F.A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill, 1981.
4. Ajoy Ghatak, Optics, Tata McGraw Hill, 5th addition, 2012.
5. Vladimir V. Mitin, Dmitry I. Sementsov, An Introduction to Applied Electromagnetics and Optics, CRC Press, Taylor and Francis Group, 2017.

Other useful resource(s):

1. Link to topics related to course:
   i. https://nptel.ac.in/courses/122107035/
   ii. https://nptel.ac.in/courses/122103011/
   iii. https://nptel.ac.in/courses/122101002/28
   iv. https://nptel.ac.in/courses/122105023/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Engineering Physics-I)	PO-1	PO-2	PO-3	\PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2				2				2		2	**1.25**
CO-2	2	2	2	2	2	2				2		2	**2**
CO-3	3	2				2				2		2	**1.4**
CO-4	3	3				2				2		2	**1.5**
CO-5	3	3	3	3	3	3				3		3	**3**
Average	**2.6**	**2.4**	**2.5**	**2.5**	**2.5**	**2.2**				**2.2**		**2.2**	

Engineering Physics Lab-I

COURSE CODE: 18B17PH171

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P : 0-0-2

List of Experiments:

S.No	Description	Hours
1	To determine the wavelength of sodium light by measuring the diameters of Newton's Rings	4
2	To find the wavelength of sodium light using Fresnel's biprism.	2
3	To determine the distance between two virtual source using biprism.	2
4	To measure the wavelengths of certain lines in the spectrum of the mercury lamp using plane transmission grating.	2
5	To determine the dispersive power of the material of prism with the help of a spectrometer.	2
6	To measure the angle of prism with the help of a spectrometer.	2
7	To determine the magnetic susceptibility of a given paramagnetic liquid using Quinck's method.	4
8	To find the specific rotation of sugar solution by using a half shade polarimeter.	4
9	To find the specific rotation of sugar solution by using a biquartz polarimeter.	4
10	To verify the Malus's law for a given light using polarizer and analyzer.	2
Total Lab hours		**28**

Suggested/Resources:

1. S. P. Singh, Advanced Practical Physics,Pragati Prakashan, Vol. 1 (2013).
2. C. L. Arora, Practical Physics, S. Chand Company Limited, 20th edition (2004).
3. N. Subrahmanayam, Brij Lal and M.N. Avadhanulu, A Text Book of Optics, S. Chand (2012)
4. Ajoy Ghatak, Optics, Tata McGraw Hill, 5th addition, (2012)
5. F.A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill (1981).
6. Dabir S. Viswanath, Tushar Ghosh, Dasika H.L. Prasad, Nidamarty V.K. Dutt, Kalipatnapu Y. Rani , Viscosity of Liquids: Theory, Estimation, Experiment, and Data , Springer (2007).

Problem Solving and Programming

COURSE CODE: 24B11CI111

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Prerequisite: None

Course Objectives:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To understand various number systems associated with C.
6. To decompose a problem into functions and synthesize a complete program using divide and conquer
7. approach.
8. 6. To use arrays, pointers and structures to formulate algorithms and programs.
9. 7. To apply programming to solve matrix addition and multiplication problems and searching and sorting
10. problems.
11. 8. To apply programming to solve simple numerical method problems, namely rot finding of function,
12. differentiation of function and simple integration

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To formulate simple algorithms for arithmetic and logical problems.	Familiarity
CO-2	To translate the algorithms to programs (in C language).	Assessment
CO-3	To understand various number systems associated with C	Usage
CO-4	To test and execute the programs and correct syntax and logical errors.	Usage
CO-5	To implement conditional branching, iteration and recursion.	Usage
CO-6	To use arrays, pointers and structures to formulate algorithms and programs.	Usage

CO-7	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Programming, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture) From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable	**4**
2	Number System: Decimal, Binary, Octal, Hexadecimal and interconversion.	**3**
3	Arithmetic expressions and precedence	**3**
4	Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching	**6**
5	Arrays (1-D, 2-D), Character arrays and Strings	**4**
6	Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs	**4**
7	Function: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort and Merge sort. Tracking Recursion	**8**
8	Idea of pointers, Defining pointers, Use of Pointers in self-referential structures.	**4**
9	Structures, Defining structures and Array of Structures, notion of linked list (Basic Idea of Implementation).	**2**
10	File Handling	**4**
Total lectures		**42**

Suggested Text Book(s):

1. Mittal, Ajay. Programming in C: A Practical Approach. Pearson Education India, 2010.
2. Kernighan, Brian W., and Dennis M. Ritchie. "The C programming language." (2002).

Suggested Reference Book(s):

1. Deitel, H., and PJ C+ Deitel. How to program. Pearson, 2021.

Other useful resource(s):

1. Link to NPTEL course contents: https://www.youtube.com/watch?v=t9WKOcRB63Q&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	**1.75**
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2.00**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.08**
CO-5	2	3	3	3	3	1	1	1	2	2	1	2	**2.00**
CO-6	2	2	2	2	2	1	1	1	2	2	2	2	**1.75**
CO-7	2	3	3	3	3	1	1	1	2	2	1	2	**2.00**
Average	**2.00**	**2.57**	**2.57**	**2.57**	**2.57**	**1.00**	**1.00**	**1.00**	**2.00**	**2.14**	**1.43**	**2.00**	**1.90**

Engineering Graphics

COURSE CODE: 18B17GE173

COURSE CREDITS: 1.5

CORE/ELECTIVE: CORE

L-T-P : 0-0-3

Pre-requisite: None

Course Objectives:

1. To introduce the students to the "universal language of Engineers" for effective communication through drafting exercises of geometrical solids.
2. To enable students to acquire and use engineering drawing skills as a means of accurately and clearly communicating ideas, information and instructions.
3. To impart knowledge to students about creating a sheet and software aided layout of required dimensions in 2-D and 3-D view.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	To impart and inculcate proper understanding of the theory of projection.	Familiarity
CO2	To improve the visualization skills	Assessment
CO3	To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient	Usage
CO4	To impart the knowledge on understanding and drawing of simple residential/office buildings.	Usage

List of Experiments

S.No	Description	Hours
1	Introduction to Lettering	**3**
2	Scales and their types	**2**
3	Construction of Polygons	**4**
4	Projection of points	**2**
5	Projection of lines	**4**
6	Projection of planes	**3**
7	Drawing of building plan	**6**
8	Introduction to Basic Commands in Auto-CAD	**3**

9	Orthographic projections in Auto-CAD	**3**
10	Isometric Projection in Auto-CAD	**4**
11	Projections of solids in Auto-CAD	**1**
12	Section of solids in Auto-CAD	**1**
Total Lab hours		**36**

Suggested/Resources:

1. Engineering Drawing & Graphics with AutoCAD by K.Venugopal, New Age International Pvt. Ltd., New Delhi (India)
2. Engineering Drawing by N.D.Bhatt, V.M.Panchal and Pramod R. Ingle, Charotar Publishing House, Anand, Gujarat (India)
3. Engineering Drawing [With Introduction to Auto-CAD] by Roop Lal and Ramakant Rana, IK International Publishing House Pvt. Ltd.

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	10 Marks
4	Lab Assessment	50 Marks
	Total	**100 marks**

Problem Solving and Programming Lab

COURSE CODE: 24B17CI171
COURSE CREDITS: 1
CORE/ELECTIVE:
L-T-P: 0-0-2

Pre-requisite: Fundamentals of C Programming and Algorithms

Course Objectives:

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understanding C program development, Compilation, debunking, running, etc.	Familiarity
CO-2	Introduction to C Programming using Control Statements and Repetition Statement	Usage
CO-3	Apply and practice logical formulations to solve some simple problems leading to specific problems.	Assessment
CO-4	Design effectively the required programming components that efficiently solve computing problems in the real world.	Usage

List of Experiments

S. No	Description	Hours
1	Getting acquainted with the C program Structure and basic Functions, Getting acquainted with the various data types and arithmetic operators in C	**2**
2	Write a program to obtain the reversed number and to determine whether the original and reversed numbers are equal or not.	**2**
3	Write a program to check whether a triangle is valid or not, when the three angles of triangle are entered through the keyboard. A triangle is valid if the sum of all three angles is equal to 180 degrees.	**2**
4	Check a given I/P is character, number or special symbol.	**2**
5	WAP to check if a given number is Armstrong or not. Calculate factorial of a number, Given number is prime or not.	**2**
6	(a) Write a program to add the first seven terms of the following series using any loop: 1/1! + 2/2! + 3/3! +..... (b) Develop start patterns using loops	**4**

7	Swap two numbers via various methods.	**2**
8	Functions and Recursion Applications: Factorial, sum, etc.	**2**
9	Programs on Arrays: searching and sorting	**3**
10	Dynamic Memory Allocation and Structures	**2**
11	File Handling	**2**
Total Lab hours		**25**

Suggested/Resources:

1. Deitel and Deitel, C How to Program, 7° Edition, 2013.
2. Venugopal Prasad, Mastering C, Tata McGraw Hill.
3. Complete Reference with C, Tata McGraw Hill.
4. Drmey, How to solve it by Computer, PHI.
5. Kerninghan and Ritchie, The C Programming Language.
6. http://www.acm.uiuc.edu/webmonkeys/book/c_guide/
7. http://msdn.microsoft.com/en-us/library/25db87se.aspx

Evaluation Scheme:

S. No	Exam	Marks
1	Mid Sem. Evalution	20
2	End Sem. Evalution	20
3.	Attendance	15
4.	Lab Assessment	45
	Total	**100**

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	1	1	1	1	1	1	**1.83**
CO-2	3	3	3	3	3	1	1	1	1	1	1	3	**2.00**
CO-3	3	3	2	3	2	3	2	1	1	1	2	1	**2.00**
CO-4	3	3	3	2	3	2	1	1	1	1	1	1	**1.83**
CO-5	2	2	3	3	3	3	1	1	1	1	1	1	**1.83**
CO-6	2	3	3	3	2	2	2	2	2	2	2	2	**2.25**
Average	**2.67**	**2.83**	**2.83**	**2.83**	**2.50**	**2.17**	**1.33**	**1.17**	**1.17**	**1.17**	**1.33**	**1.50**	**1.96**

Engineering Mathematics - II

COURSE CODE:

COURSE CREDITS:4

CORE/ELECTIVE: CORE

L-T-P: 3-1-0

Pre-requisite: Engineering Mathematics - I

Course Objectives:

- To study various methods of solving the second order differential equations with variable coefficients,
- To study the basic properties of Bessel functions, Legendre polynomials and their applications.
- To learn finding the solutions of heat and wave equations.
- To study calculus of complex variables.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Solve problems related to convergence of series & Fourier series	Familiarity & Usage
CO-2	Understand basics of ordinary differential equation, comprehend series solution with certain special functions e.g. Bessel, Legendre Equation.	Assessment & Usage
CO-3	Understand partial differential equations and solve heat and wave equations	Usage
CO-4	Understand functions of a complex variable, analytic functions and harmonic functions.	Usage
CO-5	Solve contour integration and find Taylor's and Laurent's series, evaluate certain real definite and improper integrals.	Familiarity & Usage

CourseContents:

Unit	Contents	Lectures required
1	**Infinite series and Fourier series:** Convergence of sequence and series, tests for convergence; Power series. Definition of Fourier series, orthogonal and orthonormal functions, Fourier series with arbitrary period, half range Fourier sine and cosine series.	8
2	**Ordinary differential equations:** Introduction to first order differential equations, second and higher order differential equations with constant coefficients. Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation, Power series solutions, Legendre polynomials, Bessel functions of the first kind and their properties, solving IVPs using Laplace Transformation.	12

3	**Partial Differential Equations:** Introduction to partial differential equations, second order PDEs - one dimensional wave, heat equations with applications in science and technology, solution by separation of variables method using Fourier series.	**6**
4	**Complex Variables (Differentiation):** Limit, continuity and differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, elementary analytic functions (exponential, trigonometric, logarithm) and their properties.	**8**
5	**Complex Variables (Integration):** Contour integrals, Cauchy theorem, Cauchy integral formula, zeros of analytic functions, singularities, Taylor's & Laurent's series, residues, Cauchy residue theorem, evaluation of definite integral involving sine and cosine, improper integrals.	**8**
	Total Lectures	**42**

Suggested Text Book(s):

- Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2023.
- R K Jain and SRK Iyengar, Advanced Engineering Mathematics, 5th Edition, Narosa Publishing House, 2016.

Reference Book(s):

- Brown, J. W., Churchill, R.V., Complex Variables and Applications, 9th Edition. McGraw Hill 2023.

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/ ScopeofExamination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2)-8 Quizzes (3) -12 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Engineering Mathematics- II)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	**1.75**
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.0**
CO-5	2	3	3	3	2	1	1	1	2	3	2	2	**2.0**
Average	**2**	**2.6**	**2.6**	**2.6**	**2.4**	**1**	**1**	**1**	**2**	**2.4**	**1.6**	**2**	

Engineering Physics-II

Course code: 18B11PH211

Course credits: 3

Core/Elective: Core
L-T-P: 3-0-0
Pre-requisite: None

Course Objectives:

I. To offer a broad aspect of those areas of Physics which are specifically required as an essential background to engineering students for their studies in higher semesters.
II. To enable the students in gaining problem solving capability
III. To enable the students in acquiring better understanding about quantum science and application for future technology
IV. To familiarize students with quantum information technology
V. To make the students knowledgeable about the thermodynamics and statistics
VI. In conclusion, the ability of students should have enhanced to think logically about the problems of science and technology

Course Outcomes:

S.No.	Course Outcomes	Level of Attachment
CO-1	To learn fundamentals of quantum applications, quantum information theory	Familiarity
CO-2	Knowledge of physical interpretation, and ability to apply ideas to solve problems in science	Familiarity/Problems solving
CO-3	Learning about thermodynamical problems and associated applications for future technology	Familiarity/Problem solving
CO-4	To understand basics of statistical distribution and use of Maxwell's distribution, Bose-Einstein distribution, and Fermi-Dirac distribution	Familiarity/Analytical skills/Problems solving
CO-5	To develop ideas about problems associated to quantum information	Familiarity/Knowledge

Course Contents:

Unit	Contents	Lecture required
1	Quantum nature of light: Photoelectric effect and Compton effect	**4**
2	Stability of atoms and Bohr's rules	**2**
3	Wave particle duality: de Broglie wavelength, phase and group velocity, Uncertainty principle, Double slit experiment	**4**
4	Schrodinger's equation, Physical interpretations of wave functions, elementary idea of operators, Eigenvalue problems	**4**
5	Solution of Schrodinger equations, simple boundary value problems, Harmonic Oscillator, Hydrogen atoms problems	**4**
6	Basics of quantum information: Hilbert's space, Dirac notation, Introduction to qubits, Quantum states, density operators, generalized measurements, quantum operations/channels, no-cloning theorem	**6**
7	Laws of thermodynamics, introduction to entropy, isothermal and adiabatic process, Reversible and irreversible processes. Carnot cycle and Carnot engine, Refrigerator, Clausius-Cleyperon equation	**10**
8	Introduction to macrostate, microstate, Classical and quantum statistics, Density of states M-B, B-E, and F-D statistical distribution, their applications	**8**
Total lectures		**42**

Suggested Text Book(s):

1. R. Eisberg and R. Resnick, "Quantum Physics" John Wiley, 2nd Edition, 2002.
2. J.J. Sakurai, Jim Napolitano "Modern quantum mechanics" 2nd Ed. I, 2011
3. Quantum information Theory, Mark M. Wilde, Cambridge University Press, 2012.
4. Brij Lal, N Subrahmanyam and P.S. Hemne, Heat Thermodynamics and Statistical Physics, S. Chand, 3rd edition, 2012.
5. Modern Quantum Mechanics and Quantum Information, by J S Faulkner Department of Physics, Florida Atlantic University, Boca Raton, Florida, FL, USA, IOP Publishing Ltd, 2021.

Suggested Reference Book(s):

1. Silvio R A, Salinass, Introduction to Statistical Physics, Springer Verlag, 2004.
2. Quantum Computation and Quantum Information, M. A. Nielsen &I.Chuang, Cambridge University Press, 2000.
3. Lakhanpal R C, Modern Approach to Statistical Physics and Thermodynamics, Modern Publishers, 2003.
4. Introduction to. Quantum Mechanics. David J. Griffiths. Reed College. Prentice Hall. Upper Saddle River, New Jersey 07458, 1994.

5 Michael A. Nielsen, and Isaac L. Chuang. "Quantum Computation and Quantum Information: 10th Anniversary Edition", Canbridge university press, 2010.

Other useful resource(s):

1. https://www.qi.damtp.cam.ac.uk/part-iii-quantum-information-theory
2. https://www.youtube.com/watch?v=bE5flUzaU1w
3. https://www.youtube.com/watch?v=EuYBGnsCj14

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (3) -15 Quizzes(2) -5 Attendance - 5

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Engineering Physics - II)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	1	1	-	-	-	-	2	**2.125**
CO-2	2	3	3	3	3	1	1	-	-	-	-	3	**2.375**
CO-3	3	2	2	2	2	1	1	-	-	-	-	2	**1.875**
CO-4	3	2	2	2	2	3	3	-	-	-	-	2	**1.875**
CO-5	2	3	3	3	3	1	1	-	-	-	-	3	**2.375**
Average	**2.6**	**2.6**	**2.6**	**2.4**	**2.4**	**1.4**	**1.4**	**-**	**-**	**-**	**-**	**2.4**	

Engineering Physics Lab-II

COURSE CODE: 18B17PH271

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P : 0-0-2

Pre-requisite: None

Course Objectives:

1. The Art of Experimentation: The introductory laboratory engages each student in significant experiences with experimental processes, including some experience in investigation.
2. Experimental and Analytical Skills: The laboratory help the student develop a broad array of basic skills and tools of experimental physics and data analysis.
3. Conceptual Learning: The laboratory help student's to understand basic physics concepts.
4. Understanding the Basis of Knowledge in Physics: The laboratory help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
5. Developing Collaborative Learning Skills: The laboratory helps students to develop collaborative learning skills that are vital to success in many lifelong endeavors.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	To Understand different aspects of magnetism and semi conductive properties of materials and their use in design of various devices.	Familiarity
CO2	To helps the students to understand the concepts of light propagation in optical fiber and introduce them to various losses in optical fiber communication.	Familiarity and Assessment
CO3	To demonstrate the scientific results based on observation.	Assessment and usage
CO4	Scientific discussion for clear and concise conclusion on particular scientific results.	Assessment and usage
CO5	To develop collaborative learning skills	Assessment and usage

List of Experiments:

S.No	Description	Hours
1	To determine the numerical aperture, of an optical fibre using LED as a light source.	**2**

2	To determine the attenuation coefficient, losses of an optical fiber	**2**
3	To measure resistivity of semiconductor using four probe methods.	**2**
4	To measure energy band gap of the Ge crystal using four probe methods and compare with optical band gap.	**2**
5	To study Hall effect in semiconductor and determination of its allied parameters.	**2**
6	To determine the carrier concentration and type of doping using hall coefficient.	**2**
7	To calculate the e/m ratio for an electron using Thomson method/Bar magnet method	**4**
8	To study magnetostriction in magnetic materials using He-Ne laser.	**4**
9	To study the coercivity, saturation magnetization, retentivity of given materials.	**4**
10	Experimental Determination of Planck's constant using Light Emitting Diodes (LEDs) and Photoelectric Effect.	**4**
Total Lab hours		**28**

Suggested/Resources:

1. S. P. Singh, Advanced Practical Physics,Pragati Prakashan, Vol. 1 (2013).
2. C. L. Arora, Practical Physics, S. Chand Company Limited, 20th edition (2004).
3. N. Subrahmanayam, Brij Lal and M.N. Avadhanulu, A Text Book of Optics, S. Chand (2012)
4. Ajoy Ghatak, Optics, Tata McGraw Hill, 5th addition, (2012)
5. F.A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill (1981).
6. Dabir S. Viswanath, Tushar Ghosh, Dasika H.L. Prasad, Nidamarty V.K. Dutt, Kalipatnapu Y. Rani , Viscosity of Liquids: Theory, Estimation, Experiment, and Data , Springer (2007).

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	3	1	1	1	**2.00**
CO2	3	3	3	3	2	2	1	1	3	1	1	1	**2.00**

CO3	3	3	3	3	2	2	1	1	3	1	1	1	**2.00**
CO4	2	2	2	2	2	2	1	1	1	1	1	1	**1.5**
CO5	2	2	2	2	2	2	1	1	1	1	1	1	**1.5**
Average	**2.6**	**2.6**	**2.6**	**2.6**	**2.0**	**2.0**	**1.0**	**1.00**	**2.2**	**1.00**	**1.0**	**1.0**	

Basic Electrical Engineering

COURSE CODE:

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P: 3-1-0

Pre-requisite: None

Course Objectives:

To have a good understanding and application of a broad set of analytical tools to analyze Electrical Circuits.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the three simple scientific laws, Ohm's law, Kirchhoff's Voltage and Current Laws	Familiarity
CO-2	Application of Ohm's law, KCL and KVL to analyze circuits by different techniques.	Usage
CO-3	Analysis of time varying responses of circuits consisting of capacitors and inductors	Familiarity
CO-4	Understanding sinusoidal steady state analysis of various AC circuits.	Usage
CO-5	Understand the principle of mutual coupling and its significance in the power system.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**DC Analysis:** Basic Components and Electric circuits, Voltage and Current laws, Basic Nodal and Mesh Analysis including supernode and supermesh, Comparison of Nodal and Mesh Analysis.	10
2	**Circuit Analysis Techniques:** Superposition, Source Transformation, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer Theorem, Delta-Wye Conversion	6
3	**Time-domain analysis of RL, RC and RLC circuits:** Capacitors and Inductors, Basic RL and RC circuits (The source free RL and RC circuits, Driven RL and RC circuits, Natural and forced response). Second order RLC circuits: critically damped, under damped, over damped and un-damped responses: Complete response	7 3
4	**AC Analysis:** Characteristics of Sinusoids, Forced response to Sinusoidal Functions, Complex Forcing function, Phasor, Impedance and Admittance, Nodal and Mesh Analyis, Superposition, Source Transformation and Thevenins Theorem,	8

	Phasor Diagrams	
5	**AC Circuit Power Analysis:** Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power and Power Factor, Complex Power. Power Factor Correction	**3**
6	**Magnetically Coupled Circuits:** Mutual Inductance, The linear transformer and the ideal transformer. Electric Motor and Electric Generator principle.	**5**
Total lectures		**42**

Suggested Text Book(s):

1. W.H. Hayt, J. E. Kemerlay & S.M. Durbin: Engineering Circuit Analysis, 6th Ed., TATA McGraw Hill, 2006.
2. J. Hiley, K. Brown, & I.M. Smith: Electrical and Electronic Technology, 10th Ed., Pearson, 2019.
3. D.C. Kulshreshtha: Basic Electrical Engineering, 1stEd., McGraw Hill Education, 2011.

Suggested Reference Book(s):

1. Ozgur Ergul: Introduction to Electrical Circuit Analysis, 1st Ed., Wiley , 2017.
2. V.N. Mittle and Arvind Mittal: Basic Electrical Engineering, 2nd Ed., Tata McGraw Hill, 2015.

Other useful resource(s):

Link to NPTEL course contents:https://nptel.ac.in/courses/108102097/3 (Prof. S.C. Dutta Roy, IIT Delhi)

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Basic Electrical Engineering)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	1	1	1	1	1	3	**2**
CO-2	3	2	2	2	3	2	1	1	1	1	2	3	**1.92**
CO-3	3	3	3	3	2	2	1	1	1	1	1	3	**2**
CO-4	3	3	3	3	2	2	1	1	1	1	1	3	**2**
CO-5	3	3	3	3	3	2	1	1	1	1	2	3	**2.17**
Average	**3**	**2.8**	**2.8**	**2.8**	**2.4**	**2**	**1**	**1**	**1**	**1**	**1.4**	**3**	

Basic Electrical Engineering Lab

COURSE CODE:

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. The primary objective of this course is to provide a thorough understanding of circuit analysis and measurement of various electrical parameters.
2. Analysis of a given circuit depending on types of elements - DC analysis, Transient analysis and Frequency analysis.
3. To acquire hands on experience of conducting various experiments on electrical machines.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Understanding basic electrical sources and measuring devices: Power supply, Multimeter, CRO/DSO and Function Generator.	Familiarity
CO2	Understand the basic working principle of a transformer and the operation of electrical machines.	Usages
CO3	Practical implementation of the fundamental electrical theorems and modeling of simple electrical systems.	Usages
CO4	Accurate measurement of voltage, current, power and impedance of any circuit.	Usages
CO5	DC analysis, Transient analysis and Frequency analysis of a given circuit depending on types of elements.	Assessment
CO6	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts.	Assessment

List of Experiments

S.No	Description	Hours
1	Introduction to Power supply & Multimeter.	2
2	To determine the equivalent resistance of a circuit using color code and to verify it using a multimeter. To verify Voltage divider and Current divider.	2
3	To verify Delta to Star and Star to Delta conversion.	2
4	Introduction to CRO & Function Generator	2
5	To verify Kirchoff's voltage law (KVL) and Kirchoff's Current Law (KCL)	2
6	To verify Superposition Theorem	2
7	To verify Norton's Theorem	2
8	To verify Thevenin's Theorem and Maximum Power Transfer Theorem	2

9	To study the transient response of series RC circuits using different values and R and C	2
10	Determination of frequency response of current in RLC circuit with sinusoidal ac input	2
11	To determine the turns ratio and polarities of transformer windings.	2
12	To obtain the equivalent circuit parameters from OC and SC tests, and to estimate efficiency & regulation at various loads.	2
Total Lab hours		24

Suggested Resources:

1. W.H. Hayt, J. E. Kemerlay & S.M. Durbin, "Engineering Circuit Analysis", Eighth Edition, McGraw Hill, 2012.
2. Van Valkenburg, "Network Analysis", Prentice-Hall India, 2001.
3. D.C. Kulshreshtha, "Basic Electrical Engineering", First Edition, McGraw Hill, 2011.

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Program Outcomes (POs)

CO /PO	PO1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	Aver age
CO1	3	3	3	2	2	2	3	1	1	1	1	1	1.92
CO2	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	3	2	3	3	3	2	1	1	1	1	1	1	1.83
C06	3	3	3	3	2	2	2	3	2	2	2	2	2.42
Aver age	3.00	2.8 3	2.83	2.5 0	2.5 0	2.1 7	1.6 7	1.3 3	1.1 7	1.17	1.33	1.17	

Data Structure and Algorithms

COURSE CODE: 18B11CI211

COURSE CREDIT: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisites: C/C++

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures
5. Introduce students to data abstraction and fundamental data structures.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type.	Familiarity
CO-2	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	Assessment
CO-3	For a given Search problem (Linear Search and Binary Search) student will able to implement it.	Assessment
CO-4	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Assessment
CO-5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Assessment
CO-6	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	7
2	**Stacks:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.	5
3	**Queues:** ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	5

4	**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	**8**
5	**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	**6**
6	**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	**6**
7	**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	**5**
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

Suggested Reference Book(s):

1. "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.
3. "Data structures and Algorithms Made Easy" 5th edition by Narasimha Karumanchi, Career monk publications
4. "Data Stru**c**ture and Algorithms in C" 2nd edition by Mark Allen Weiss (2002), Pearson Education

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106102064/
2. Link to topics related to course:
   - **a.** https://onlinecourses.nptel.ac.in/noc18_cs25/preview
   - **b.** https://nptel.ac.in/courses/106103069/
   - **c.** http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10

				Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Data Structure and Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	**2.4**
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	**2.5**
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	**2.4**
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	**2.5**
Average	**3**	**3**	**3**	**2**	**2.7**	**2.8**	**2**	**2**	**2.5**	**3**	**1**	**3**	

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Bioinstrumentation Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	3	1	1	1	1	1	1	1	3	**1.75**
CO-2	3	3	3	3	2	1	1	1	2	1	1	3	**2.00**
CO-3	3	3	3	3	3	1	1	2	2	1	1	3	**2.16**
CO-4	3	3	3	3	3	2	2	2	2	1	2	3	**2.42**
CO-5	3	3	3	3	2	2	1	1	1	1	1	1	**1.83**
Average	**3.00**	**3.00**	**2.80**	**3.00**	**2.20**	**1.40**	**1.20**	**1.40**	**1.60**	**1.00**	**1.20**	**2.60**	

Data Structure and Algorithms Lab

COURSE CODE: 18B17CI271

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P: 0-0-4

Pre-requisites: None

Course Objectives:

1. Develop problem solving ability using Programming
2. Develop ability to design and analyze algorithms
3. Introduce students to data abstraction and fundamental data structures
4. Develop ability to design and evaluate Abstract Data Types and data structures
5. Apply data structure concepts to various examples and real life applications

Course outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type	Familiarity
CO-2	To have hands on skills to evaluate different kinds of linked lists and their applications in day to day problem solving.	Usage
CO-3	To have hands on skills to evaluate different kinds stacks and their applications and implementations in day to day problem solving	Assessment
CO-4	To have hands on skills to evaluate different kinds queues and their applications and implementations in simulations.	Assessment
CO-5	To acquire knowledge of various sorting algorithms	Usage
CO-6	To learn Searching: Balanced tree, red-black tree, lower bounds for searching	Usage
CO-7	To learn to code for operations on Tree or BST (Creation; Traversing like pre-order,post-order and in-order; Searching element; finding height etc.)	Usage
CO-8	Introduction to Heaps	Usage
CO-9	To learn to code for operations on Graphs (Creation; entering info, printing output and deleting; traversal of BFS and DFS algorithm)	Assessment

List of Experiments:

S.No	Description	Hours
1	**Getting acquainted with**	
	a) Arrays and Strings, Structures,	2
	b) Recursion, Pointers	4
	c) Dynamic memory allocation	4
2	**Operations on: (Creation, insertion, deletion, sorting, traversing, reversing etc)**	
	a) Linear Linked List,	4
	b) Doubly and	4
	c) Circular Linked List	2
3	**Operations on Stacks:**	
	a) Creation; pushing; popping;	4
	b) testing underflow, overflow;	2

	c) prefix and postfix	2
4	**Operations on Queues:** a) Creation; b) enqueue; dequeue; c) testing underflow, overflow	 4 2 2
5	**Operations on Tree or BST:** Creation; a) Traversing like preorder, post-order and in-order; b) Searching element; finding height etc.	 4 2
6	**Implementation of sorting algorithms 1:** Insertion Sort and Selection Sort Algorithm with arrays using dynamic memory allocation.	2
7	**Implementation of sorting algorithms 2:** Bubble Sort and Merge Sort Algorithm with arrays using dynamic memory allocation.	2
8	**Implementation of sorting algorithms 3:** Implementation of Radix Sort and Quick Sort Algorithm with arrays using dynamic memory allocation.	2
9	**Operation on Heaps:** a) Heaps, b) Heap Sort	 2 2
10	**Implementation of Searching algorithms:** Linear Search Algorithm and Binary Search Algorithm using dynamic memory allocation.	2
11	**Operations on Graphs :** (Creation; entering info; printing Output and deleting; traversal of BFS and DFS algorithm etc.)	2
Total Lab hours		**56**

Minor Project(s) – (*Only for 2 credit lab)*

- Design GUI based program to solve any binary equation.
- Design GUI based program to find the roots of quadratic equation.

- Design a program that picks the characters at equal interval from the given text/paragraph and generate a new paragraph in which each set of word can't have more than 4 characters. Last word of the paragraph can have <=4 characters.
- Program to input following data into disk file. Code, name, department and salary of employee in a firm. After creating file read the file and find following-
  Methodology algorithms Code execution Future scope
  Count number of employees as per department Search record of employee
  Display record of employee
  Display list of employee in alphabetical order as per department Read record from file

Suggested Books/Resources:

1. Langsam, Augestein, Tenenbaum : Data Structures using C and C++, 2nd Edn, 2000, Horowitz and Sahani : Fundamental of Data Structures in C, 2nd Edn, 2008
2. Weiss : Data Structures and Algorithm Analysis in C/C++, 3rd Edn, 2006

3. Sahani : Data Structures, Algorithms and applications in C++, 1997.
4. Corman et al : Introduction to Algorithms, 3rd Edn., 2009
5. http://www.nptel.iitm.ac.in/video.php?subjectId=106102064, last accessed Mar 13, 2014.
6. http://www.cs.auckland.ac.nz/~jmor159/PLDS210/ds_ToC.html, last accessed Mar 13, 2014.
7. http://courses.cs.vt.edu/csonline/DataStructures/Lessons/index.html, last accessed Mar 13, 2014.
8. Link to topics related to course:
   a. http://cse.iitkgp.ac.in/~pallab/pds16/pds16.htm
   b. https://onlinecourses.nptel.ac.in/programming101/preview

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	3	2	2	3	3	3	2	3	2	2	**2.5**
CO-2	3	3	3	2	3	3	3	3	2	3	2	3	**2.8**
CO-3	3	3	3	2	2	3	3	3	3	3	2	2	**2.7**
CO-4	3	3	3	3	3	3	3	2	2	3	3	3	**2.8**
CO-5	3	3	3	2	2	2	3	3	3	3	2	2	**2.6**
CO-6	3	3	3	3	3	3	3	2	2	3	3	3	**2.8**
CO-7	3	3	3	3	3	3	2	2	3	3	3	3	**2.8**
CO-8	3	3	3	2	3	3	3	3	3	3	2	3	**2.8**
CO-9	3	3	2	3	3	3	3	3	3	2	3	3	**2.8**
Average	**3**	**2.9**	**2.9**	**2.4**	**2.7**	**2.9**	**2.9**	**2.7**	**2.6**	**2.9**	**2.4**	**2.7**	

Workshop Practices

COURSE CODE:18B17GE171

COURSE CREDITS: 1.5

CORE/ELECTIVE: CORE

L-T-P: 0-0-3

Pre-requisite: Concrete

Technology Course

Objectives:

1. To learn the basics of different workshop practices by understanding and implementing used in different shops of workshop.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Study of various carpentry processes and its applications in carpentry	Familiarity
CO2	Study and practice the use of various carpentry tools for different carpentry processes	Familiarity
CO3	Study and manufacturing of different wood working joints	Assessment
CO4	Study the principles, classification and application of different welding processes	Usage
CO5	Study and Manufacturing of various welding joints using electric arc welding and gas welding	Usage

List of Experiments

S.NO.	Subtitle	Topics
1.	Carpentry	To Study the carpentry processes
		To study and identify carpentry tools
		To prepare a T-Lap Joint
		To prepare Motise-tenon joint
		To prepare corner joint
2.	Welding	To study the different welding processes with mechanism
		To prepare lap welding joint
		To prepare butt welding joint
3.	Sheet Metal work	To cut and prepare V joint from metal using hexablade
4.	Turning	To study the lathe machine and its operation with one turning job

Suggested/Resources:

1. Workshop Practices by S.K. Hajra and Chaudhary

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	**1.83**
CO2	3	3	3	3	3	1	1	1	1	1	1	3	**2.00**
CO3	3	3	2	3	2	3	2	1	1	1	2	1	**2.00**
CO4	3	3	3	2	3	2	1	1	1	1	1	1	**1.83**
CO5	2	2	3	3	3	3	1	1	1	1	1	1	**1.83**
Average	**2.80**	**2.80**	**2.80**	**2.80**	**2.60**	**2.20**	**1.20**	**1.00**	**1.00**	**1.00**	**1.20**	**1.40**	

UNIVERSAL HUMAN VALUES II: UNDERSTANDING HARMONY

COURSE CODE: 23B11HS211

COURSE CREDITS: 3

CORE/ELECTIVE: Core

L-T-P: 2-1-0

Pre-requisite: None

Objective:

1. Development of a holistic perspective based on self-exploration about themselves (human being), Family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/ existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Self Awareness, Social awareness (family, society, nature).Sustainability in relationships and Critical thinking	Familiarity
CO-2	Introspection and self reflection	Assessment
CO-3	Sensitive to commitment towards human values, human relationship and human society.	Usage
CO-4	Developing commitment and courage	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** • Purpose and motivation for the course, recapitulation from Universal Human Values-I • Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration • Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- 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	7

	• living in harmony at various levels.	
2	**Understanding Harmony in the Human Being - Harmony in Myself!** • Understanding human being as a co-existence of the sentient 'I' and the material 'Body' • Understanding the needs of Self ('I') and 'Body' - happiness and physical facility • 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 Health; correct appraisal of Physical needs, meaning of Prosperity in detail • Programs to ensure Sanyam and Health.	**5**
3	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** • Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship • Understanding the meaning of Trust; Difference between intention and competence • Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship • Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals • Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	**6**
4	**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** • Understanding the harmony in the Nature • Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self regulation in nature • Understanding Existence as Co-existence of mutually interacting units in all-pervasive space • Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	**5**
5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**5**

	• 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, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. • Strategy for 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	
	Total Lecture Hours	**28**

Suggested Text Book(s):

- Text Book 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Suggested Reference Book(s):

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Attendance - 5 Class Performance/Assignment - 10 Quiz-10