Annexure -1 Curriculum

For B.Tech (Mechanical Engineering) , R20

First Semester

Subject code	Subject Category	Subject Title	L	T	P	IM	EM	CR
2021101	BSC	Linear Algebra and Calculus	3	0	0	30	70	3
20EC102	BSC	Engineering Chemistry	3	0	0	30	70	3
2005103	ESC	C-Programming & Data Structures	3	0	0	30	70	3
2014104	ESC	Basic Electrical & Electronics Engineering	3	0	0	30	70	3
20EW105	LC	EngineeringWorkshop	0	0	3	40	60	1.5
2005106	LC	IT Workshop	0	0	3	40	60	1.5
20EC107	BSC	Engineering Chemistry Lab	0	0	3	40	60	1.5
2005108	ESC	C-Programming & Data Structures Lab	0	0	3	40	60	1.5
2014109	ESC	Basic Electrical & Electronics Engineering Lab	0	0	2	40	60	1.5
		Total	12	0	14	320	580	19.5

Second Semester

Subject code	Subject Category	Subject Title	L	T	P	IM	EM	CR
2021201	BSC	Differential Equations and Vector Calculus	3	0	0	30	70	3
20EP202	BSC	EngineeringPhysics	3	0	0	30	70	3
2024203	HSMC	CommunicativeEnglish	3	0	0	30	70	3
2003204	ESC	Material Science	3	0	0	30	70	3
2003205	ESC	Engineering Drawing	1	0	2	30	70	2
2003206	ESC	Engineering Drawing Lab	0	0	2	40	60	1
2024208	HSMC	CommunicativeEnglish Lab	0	0	3	40	60	1.5
20EP207	BSC	EngineeringPhysics Lab	0	0	3	40	60	1.5
2003209	ESC	Material Science Lab	0	0	3	40	60	1.5
20MC211	MC	Universal Human Values	3	0	0	0	0	0.0
		Total	16	0	13	310	590	19.5

Course Title	Linear Algebra & Calculus (R20)				B. Tech. I Sem *(Common to All Branches)*		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
2021101	**BSC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hours					**End Exam Duration: 3Hours**			

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Course Outcomes : On successful completion of this course, the students will be able to

CO 1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
CO 2	Utilize mean value theorems to real life problems.
CO 3	Classify**t**he functions of several variables which is useful in optimization techniques.
CO 4	Evaluate multiple integrals.
CO 5	Define Beta and Gamma functions.

UNIT I

Matrices: (12 Hours)

Rank of a matrix by Echelon form, Normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors for real matrices – Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley–Hamilton theorem. Diagonalisation by orthogonal transformation.

Learning Outcomes:

At the end of this unit, the student will be able to

- solvesystems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors (L3).
- identify special properties of a matrix and use this information to facilitate the calculation of matrix characteristics (L3)

UNIT II

Mean Value Theorems: (08 Hours)

Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof), related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- analyze the behaviour of functions by using mean value theorems (L3)

UNIT III

Multivariable Calculus: (10 Hours)

Partial derivatives, total derivative, chain rule, change of variables, Jacobians, Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- acquire the Knowledge maxima and minima of functions of several variable (L1)
- utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT IV

Multiple Integrals: **(10 Hours)**

Evaluation of double integrals in Cartesian coordinates and polar coordinates – Change of variables in double integrals – Change the order of integration in double integrals – Evaluation of triple integrals in Cartesian and polar coordinates – Change of variables between cartesian, cylindrical and spherical polar coordinates.

Learning Outcomes:

At the end of this unit, the student will be able to

- evaluate double integrals of functions of several variables in two dimensions using cartesian and polar coordinates (L5)
- evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

UNIT V

Beta and Gamma functions: **(08 Hours)**

Beta and Gamma functions and their properties, relation betweenBeta and Gamma functions, evaluation of definite integrals using Beta and Gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- understand beta and gamma functions and its relations (L2)
- conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. Higher Engineering Mathematics, Dr. B.S. Grewal, Khanna Publishers-43 edition 2014.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Publications, 9th edition-2013.

Reference Books:

1. Higher Engineering Mathematics, B.V. Ramana, Mc. Graw Hill Education (India) Pvt. Ltd, New Delhi, 11th Edition, Reprint 2010.
2. Linear Algebra: A Modern Introduction, D Poole, 2nd Edition, Brooks/Cole, 2005.
3. A Text Book of Engineering Mathematics, N.P. Bali and Manish Goyal, Lakshmi Publications, Reprint 2008

Course Title	ENGINEERING CHEMISTRY				B. Tech. ME (I Sem)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20EC102	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Demonstrate the corrosion prevention methods and factors affecting corrosion (L2)
CO 2	Explainthe preparation, properties, and applications of thermoplastics &thermosetting,elastomers& conducting polymers. (L2)
CO 3	Explain calorific values, octane number, refining of petroleum and cracking of oils (L2)
CO 4	Explain the setting and hardening of cement and concrete phase (L2)
CO 5	Summarizethe concepts of colloids, micelle and nanomaterials (L2).

Unit 1: Water Technology (10 hrs)

Introduction –Soft Water and hardness of water, hardness of water by EDTA Method, Estimation of dissolved oxygen (Winkler's method)-Boiler troubles – Priming, foaming**,** scale and sludge, Caustic embrittlment, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

Learning outcomes:

The student will be able to

- List the differences between temporary and permanent hardness of water (L1)
- Explain the principles of reverse osmosis and electrodialysis. (L2)
- Compare quality of drinking water with BIS and WHO standards. (L2)

- Illustrate problems associated with hard water - scale and sludge. (L2)
- Explain the working principles of different Industrial water treatment processes (L2)

Unit 2: Electrochemistry and Applications: (10 hrs)

Introduction to electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bed worth ratios and uses, Factors affecting the corrosion,Cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply Nernst equation for calculating electrode and cell potentials (L3)
- Apply Pilling Bedworth rule for corrosion and corrosion prevention (L3)
- Demonstrate the corrosion prevention methods and factors affecting corrosion (L2)
- Comparedifferent batteries and their applications (L2)

Unit 3: Polymers and Fuel Chemistry: **(8 hrs)**

Introduction to polymers, Polymer dispersion index, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC and Bakelite

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol

Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, **Liquid Fuels** refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio-fuels.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain different types of polymers and their applications (L2)
- Solve the numerical problems based on Calorific value(L3)
- Select suitable fuels for IC engines (L3)
- Explain calorific values, octane number, refining of petroleum and cracking of oils (L2)

UNIT-4 Advanced Engineering Materials (10 hrs)

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point.

Building materials- Portland cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Learning Outcomes:

At the end of this unit, the students will be able to

- Identify the factors affecting the refractory material(L3)
- Illustrate the functions and properties of lubricants (L2)
- Demonstrate the phases and reactivity of concrete formation (L2)
- Identify the constituents of Portland cement (L3)
- Enumerate the reactions at setting and hardening of the cement (L3)

Unit 5: Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (Dispersion method), chemical and electrochemical method (chemical vapour deposition) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, applications of colloids and nanomaterials –medicine.

Learning Outcomes:

At the end of this unit, the students will be able to

- Summarize the concepts of colloids, micelle and nanomaterials (L2)
- Explain the synthesis of colloids with examples (L2)
- Outline the preparation of nanomaterials and metal oxides (L2)
- Identifythe application of colloids and nanomaterials in medicine.(L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, OxfordUniversity Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, McGraw
Hill, 2020.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.

Course Title	C Programming & Data Structures				B.TechISem (CSE, EEE, ME)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005103 (I Sem)	ESC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2 Hours					End Exam Duration: 3Hrs			

Course Objectives:

- The course aims to provide exposure to problem-solving through programming
- It aims to train the student to the basic concepts of the C programminglanguage
- Gain knowledge of data structures and their applications

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Formulate simple algorithms for arithmetic and logical problems and to translate the algorithms to programs (in C Language).
CO 2	Choose the loops and decision-making statements to solve the problem
CO 3	Implement different Operations on arrays
CO 4	Use functions to solve the given problem
CO 5	Understand structures, unions and pointers
CO 6	Understand need of data structures in real time situations

UNIT I:

Introduction to C programming: - C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements.**Jumping statements:** break, continue and goto statements

UNIT II:

Arrays: Introduction, Declaration and initialization of 1D and 2D arrays, **Functions:**Introduction, Category of functions, parameter passing methods, Storage Classes, Recursive functions.**Strings:**String I/O functions, string handling functions, array of strings

UNIT III:

Pointers: Introduction to pointers, declaring and initialization of pointer variable, accessing the address of variables, accessing a variable through its pointer, chain of pointers. **Structures and unions:** Introduction, defining a structure, declaring structure variable, structure initialization, accessing members of structure, copying and comparing structure variables, structures within structures, array of structures, and introduction of union.

UNIT IV:

Data Structures: Overview on data structures, stack,basic operations on stack, Applications of stacks; Queues -various classification of queues,basic operations on queues.**Searching and sorting:** linear search, binary search, bubble sort, selection sort, insertion sort.

UNIT V:

Linked Lists – Single linked list, Operations on Single Linked List: insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.**Trees** - Tree terminology, representation, Binary trees, representation, binary tree traversals. Binary tree operations.

TEXT BOOKS

1. E. Balagurusamy, C Programming and Data structures,Fourth Edition, McGrawHill.
2. RemaTheraja, Programming in C, second edition,Oxford.
3. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education

REFERENCE TEXT BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer,Pearson.
3. YashavantKanetkar, Let us C, 15th edition, BPBPublications.
4. Dr. P. ChennaReddy, Computer Fundamentals and C Programming, SecondEdition.

Course Title	Basic Electrical & Electronics Engineering					B. Tech. I Semester (CE,ME & CSE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2014104	ESC	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn basics of DC and AC circuits, Electrical Machines, Transformers and Power Systems.

Course Outcomes: On successful completion of this course, the students will be able to,

CO 1	Understand the basic fundamentals of DC& AC circuits & machines, PV cells and network reduction techniques.
CO 2	Understand the power system fundamentals and concept of AC and DC distribution systems.
CO 3	Determine the currents, voltages using mesh and nodal analysis,Average and RMS values for different waveforms.
CO 4	Obtain the EMF equation and characteristics of dc machines and Induction motor.
CO 5	Evaluate the equivalent circuit and to calculate losses of single phase transformer.

Part A: Basic Electrical Engineering

UNIT I

DC Circuits: Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem.Simple Numerical Problems.

AC Circuits: Representation of sinusoidal waveforms –Average and RMS values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, simple numerical problems.

UNIT II

DC Machines: Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Torque equation – Performance

Characteristics of DC Motor, speed control (Flux & Armature control of shunt motor), Simple numerical problems.

Transformers: Principle and operation of Single Phase Transformer –Emf equation, equivalent circuit, OC and SC tests on transformer, simple numerical problems.

Induction Motor: Principle and operation of 3-phase Induction Motor [Elementary treatment only].

Unit III

Basics of Power Systems: Typical AC power supply scheme – Generation of 3-phase supply, Definition of short, medium and long transmission lines – Concepts of AC & DC distribution system.

Text Books:

1. D. P. Kothari and I. J. Nagrath - "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. V.K. Mehta &Rohit Mehta, "Principles of Power System" – S.Chand – 2018.

References:

1. L. S. Bobrow - "Fundamentals of Electrical Engineering" - Oxford University Press - 2011.
2. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010.
3. C.L. Wadhwa – "Generation Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International Publications.

Part B: Basic Electronics Engineering

UNIT I

Diodes and Applications: Semiconductor Diode, Diode as a Switch& Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Operation and Applications of Zener Diode, LED, Photo Diode.

Transistor Characteristics: Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Biasing of Transistor Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Concepts of Small Signal Amplifiers –CE & CC Amplifiers.

UNIT II

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

UNIT III

Digital Electronics: Logic Gates, Simple combinational circuits–Half and Full Adders, BCD Adder. Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters.Introduction to Microcontrollers and their applications (Block diagram approach only).

Text Books

1. R.L.Boylestad& Louis Nashlesky, Electronic Devices &Circuit Theory, Pearson Education, 2007.

2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4th Edition, Pearson, 2017.
3. R. P. Jain, Modern Digital Electronics,3rd Edition, Tata Mcgraw Hill,2003.
4. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd Edition, Pearson, 2012.

Reference Books

1. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
2. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand& Co, 2010.

Course Title	Engineering Workshop					I stB. Tech. ME		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
20EW105	**LC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		0	0	3	1.5	40	60	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

To familiarize students with wood working,
sheet metal operations,
fitting ,
electrical house wiring skills

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Apply wood working skills in real world applications
CO 2	Build different objects with metal sheets in real world applications
CO 3	Apply fitting operations in various applications.
CO 4	Apply different types of basic electric circuit connections
CO5	Use soldering and brazing techniques

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

Half – Lapjoint

Mortise and Tenonjoint

Corner Dovetail joint or Bridlejoint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a)Taperedtray b)Conicalfunnel

c)Elbowpipe d)Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b)Dovetailfit c) Semi-circularfit
d) square fitting

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections
a) Parallelandseries b) Twowayswitch c)Godownlighting d) Tubelight
e) Threephasemotor f) Soldering ofwires

Note: In each section a minimum of three exercises are to be carried out.

Course Title	IT WORKSHOP				B.TechISem (CSE, ME) (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005106 (I Sem)	LC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	40	60	100
					End Exam Duration: 3Hrs			

Course Objectives:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system.
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LAteX.
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
CO 2	Prepare the Documents using Word processors and Prepare spread sheets for calculations .using excel and also the documents using LAteX.
CO 3	Prepare Slide presentations using the presentation tool.
CO 4	Interconnect two or more computers for information sharing.
CO 5	Access the Internet and Browse it to obtain the required information.

Preparing your Computer

Task 1:

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2:

Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods.

Task 3:

Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot.Students should record the entire installation process.

Task 4:

Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 6:

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email.

They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating email account.

Task 7:

Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8:

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered,

Image Manipulation tools.

Task 9:

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 10:

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet.

Task 11:

LateX: Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX.Styling Pages:

reviewing and customizing different paper sizes and formats.Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.).Creating basic tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

References:

1. Introduction to Computers, Peter Norton, McGraw Hill

2. MOS study guide for word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI.

3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

4. Networking your computers and devices, Rusen, PHI

5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH

6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

Course Title	ENGINEERING CHEMISTRY LAB				B. Tech. ME(I Sem)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20EC107	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		0	0	3	1.5	40	60	100
					End Exam Duration: 3Hrs			

Course Objectives:

- To verify the fundamental concepts with experiments.

Course Outcomes: At the end of the course, the students will be able to	
CO 1	**Determine** the cell constant and conductance of solutions.
CO 2	**Synthesis** of advanced polymer materials.
CO 3	**Compare** the physical properties like adsorption and viscosity.
CO 4	**Evaluate** the Iron and Calcium in cement.
CO 5	**Estimate** the hardness & dissolved oxygen content in water.

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of dissolved oxygen by Winkler's method
3. pH metric titration of strong acid vs. strong base.
4. pH metric titration of weak acid vs. strong base
5. Determination of cell constant and conductance of solutions
6. Potentiometry - determination of redox potentials and emfs
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer (Bakelite).
9. Determination of percentage of Iron in Cement sample by colorimetry
10. Estimation of Calcium in port land Cement
11. Preparation of nanomaterials by precipitation.
12. Adsorption of acetic acid by charcoal
13. Determination of percentage Moisture content in a coal sample
14. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
15. Determination of Viscosity of lubricating oil by Redwood Viscometer 2.

Course Title	C Programming & Data Structures Lab				B.TechISem (CSE, EEE, ME) (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005108 (I Sem)	ESC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	40	60	100
					End Exam Duration: 3Hrs			

Course Objectives:

- know how to write and debug programs
- know the principles of designing structured programs
- Write basic C programs using, Selection statements, Repetitive statements,
- Functions, Pointers, Arrays, Strings and structures
- To apply suitable data structure to solve real world problems

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Formulate the algorithms for simple problems
CO 2	Translate given algorithms to a working and correct program
CO 3	Correct syntax errors as reported by the compilers
CO 4	Identify and correct logical errors encountered at runtime
CO 5	Write iterative as well as recursive programs
CO 6	Represent data in arrays, strings and structures and manipulate them through a program
C O7	Write programs on data structures like stack, queue, liked list, trees etc

1. Ramesh ‘s basic salary is input through the keyboard. His dearness allowance is 40% of basic salary and house rent allowance is 20% of basic salary. Write a C program to calculate his grosssalary.
2. Write a program to take input of name, roll no and marks obtained by a student in 5 subjects each have its 100 full marks and display the name, roll no with percentage score secured.
3. a) Write a C program to find out whether a given number is even number or oddnumber.
   b) Write a C program to check whether a given year is leap year ornot.
4. Design and develop an algorithm that takes three coefficients (***a***, ***b***, and ***c***) of a

Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program for the developed algorithm and execute the same to output the possible roots for a given set of coefficients with appropriatemessages.

5. If the ages of the Ramesh, Suresh and Mahesh are input through the keyboard, write a C program to determine youngest of the three.

6. A character is entered through keyboard. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if- else and switch case. The following table shows the range of ASCII values for various characters.

Characters	ASCIIvalues
A–Z	65 – 90
a– z	97 – 122
0 – 9	48 – 57
Specialsymbols	0 – 47, 58 – 64, 91 – 96, 123 – 127.

7. Write a C program which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use switchstatement).

8. Design and develop an algorithm to find whether a given number is Armstrong number or not. Implement a C program for the developedalgorithm.
9. Design and develop an algorithm to check whether a given number is palindrome or not. Implement a C program for thesame.
10. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by theuser.
11. Write a C program to generate the first N terms of Fibonacci sequence.
12. Write a C program to find the smallest and largest number in a givenarray.
13. Write a C program to find the frequency of a particular number in a list ofintegers.
14. Write a C program to sort the list of elementsusing
    a) BubbleSort b) Selectionsort.
15. Write a C program to search for an element in a list of elementsusing
    a) Linear search b) Binary search
16. Write a C program to read two matrices and perform the following operations
    a) Addition of two matrices
    b) Multiplication of two matrices

17. **Partitioning an array**
    Given a randomly ordered array of n elements, write a C program to partition the elements into two subsets such that elements ≤X are in one subset and elements ≥X are in another subset.

18. Write a C program to rearrange the elements in an array so that they appear in reverse order.

19. If a string and its reversed string are same then the string is called as palindrome string. Design and develop an algorithm to check whether a given string is a palindrome or not and implement a C program for the same.

20. Write a C program to read two strings and perform the following operations without using built string library functions.

i) String length ii) String reversing

iii) Comparison of two strings iv) Concatenation of two strings

21. Write a C program to count the number of vowels, consonants, digits, blank space sand special characters in a given string.

22. Write a C program to swap the contents of two variables using

a) Call byvalue

b) Call byreference.

23. Write a C program using recursionto

a) Find the factorial of a givennumber

b) Print the Fibonacci series up to a given number.

c) Find the GCD of twointegers.

24. Write a C program to define a structure with the followingmembers. Roll No., Name, marks in Sub1, Sub2, Sub3. Read the n students records and find the total marks of each student and print the result in the following format.

Roll No	Name	Sub1	Sub2	Sub3	Total marks	result
189Y1A0501	Kavya	80	70	75	225	Distinction

25. Write C programs that implement stack (its operations) using

i) Arrays

ii) Pointers

26. Write C programs that implement Queue (its operations) using

i) Arrays

ii) Pointers

27. Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

28. Write a C program that uses functions to perform the following operations on single linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

29. Write a C program that uses functions to perform the following operations on Double linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

30. Write a C program that uses functions to perform the following:

i) Creating a Binary Tree of integers

ii) Traversing the above binary tree in preorder, inorder and postorder.

TEXT BOOKS

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
2. B.A.Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg&Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011
4. E. Balagurusamy, Programming in ANSI C, Fifth Edition, McGrawHill.

Course Title	Basic Electrical & Electronics Engineering Lab					B. Tech. I Semester (CE,ME & CSE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2014109	ESC	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn basics of DC and AC circuits, Electrical Machines, Transformers and Power Systems.

Course Outcomes: On successful completion of this course, the students will be able to,

CO 1	Understand the Kirchhoff's laws superposition theorem theoretically and practically for any given circuit and I-V characteristics of solar PV Cell
CO 2	Obtain the efficiency and regulation for single phase transformer.
CO 3	Verify the superposition theorem theoretically and practically for any given circuit
CO 4	Determine the speed, torque and efficiency of dc shunt motor.

Part – A

Basic Electrical Engineering Lab (Any 5 experiments)

List of experiments:

1. Verification of Kirchhoff laws
2. Verification of Superposition Theorem
3. Magnetization characteristics of a DC Shunt Generator
4. Speed control of DC Shunt Motor
5. OC & SC test of 1 – Phase Transformer
6. Load test on 1-Phase Transformer
7. Brake test on DC Shunt Motor
8. Measurement of Real & Reactive Power by single phase RL,RC circuits

Part – B

Basic Electronics Engineering Lab (Any 5 experiments)

List of Experiments

1. PN Junction diode characteristics A) Forward bias B) Reverse bias
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filter
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-AMPs.
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

SECOND SEMESTER SUBJECTS

Course Title	Differential Equations and Vector Calculus				B. Tech. ISTME			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2021201	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Classify second and higher order liner D.E's with constant coefficients.**
CO 2	**Solve partial differential equations.**
CO 3	**Analyze the applications of partial differential equations.**
CO 4	**Understand vector differentiation concepts.**
CO5	**Apply vector integration concepts.**

UNIT I

Linear differential equations of higher order (constant coefficients) : (10 Hours)
Definitions, homogeneous and non- homogeneous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters.

Learning Outcomes:
At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients (L3)
- solve the linear differential equations with constant coefficients by appropriate method (L3)
- classify and interpret the solutions of linear differential equations (L3)

UNIT II

Partial Differential Equations: (10 Hours)

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (L3)
- outline the basic properties of standard PDEs (L2)

UNIT III

Applications of Partial Differential Equations: (10 Hours)

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation.

Learning Outcomes:

At the end of this unit, the student will be able to

- classify the PDE (L3)
- learn the applications of PDEs (L2)

UNIT IV

Vector differentiation: (08 Hours)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply del to scalar and vector point functions (L3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT V

Vector integration:(08 Hours)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Higher Engineering Mathematics, Dr. B.S. Grewal, Khanna Publishers-43 edition 2014.

2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Publications, 9th edition-2013
3. Calculus and Analytic geometry, G.B. Thomas and R.L. Finney, Pearson, 9th Edition, Reprint, 2002.

Reference Books:

1. Higher Engineering Mathematics, B.V. Ramana, Mc. Graw Hill Education (India) Pvt. Ltd, New Delhi, 11th Edition, Reprint 2010.
2. A Text Book of Engineering Mathematics, N.P. Bali and ManishGoyal, Lakshmi Publications, Reprint 2008.
3. Differential Equations and Vector Calculus, Dr.B.RamaBhupal Reddy, G.Sreedhar, Dr.V.Ramachandra Reddy, Research India Publications, Delhi, 2020

Course Outcomes:

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

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

Course Title	ENGINEERING PHYSICS				B. Tech. ME -II Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
20EP202	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction related to its Engineering applications. .
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications.
- To open new avenues of knowledge in magnetic materials which find potential in the emerging micro device applications.
- To familiarize the concepts of theoretical acoustics to practical use in engineering field.
- To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.

Course Outcomes: On successful completion of this course, the students will be able to

CO1	**Understand**the different realms of physics and their applications in both scientific and technological systems through physical optics.
CO2	**Identify** the wave properties of light and the interaction of energy with the matter.
CO3	**Illustrate** the response of magnetic materials to the applied electric and magnetic fields.
CO4	**Explain** the basic concepts of acoustics and ultrasonics.
CO5	**Classify** the important properties of crystals like the presence of long-range order, periodicity and structure determination using X-ray diffraction technique.

Unit-I: Wave Optics **10hrs**

Interference-Principle of superposition –Interference of light – Conditions for sustained interference– Interference in thin films (Reflection Geometry)– Colors in thin films – Newton's Rings- Determination of wavelength and refractive index.

Diffraction-Introduction– Fresnel and Fraunhofer diffraction– Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Unit Outcomes:
The students will be able to

- **Explain**the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Analyze** the differences between interference and diffraction with applications (L4)

Unit-II: Lasers and Fiber optics 8hrs

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics-Introduction –Principle of optical fiber – Acceptance Angle– Numerical Aperture – Classification of optical fibers based on refractive index profile and modes –Block diagram of Optical fiber Communication system –Propagation Losses (Qualitative) – Applications.

Unit Outcomes:
The students will be able to

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **Explain** the working principle of optical fibers (L2)
- **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **Identify** the applications of optical fibers in various fields (L2)

UNIT III:Engineering Materials 10hrs

Magnetic Materials- Introduction to magnetic materials - Classification of magnetic materials: Dia, para& Ferro– Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition , Sol-Gel method – Characteristics ofnanomaterials - Applications of nanomaterials.

Unit Outcomes:
The students will be able to

- **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **Explain** the applications of magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)
- **Identify** the nano size dependent properties of nanomaterials (L2)
- **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2)
- **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Unit-IV: Acoustics and Ultrasonics 10hrs

Acoustics- Introduction – Requirements of acoustically good hall– Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) –

Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating — Pulse echo system through transmission and reflection modes – Applications.

Unit Outcomes:

The students will be able to

- **Explain** how sound is propagated in buildings (L2)
- **Analyze** acoustic properties of typically used materials in buildings (L4)
- **Recognize** sound level disruptors and their use in architectural acoustics (L2)
- **Identify** the use of ultrasonics in different fields (L3)

Unit-V: Crystallography and X-ray diffraction 8hrs

Crystallography- Space lattice,Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems –Packing fraction– Coordination number– Packing fraction of SC,BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-ray diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

Unit Outcomes:

The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze**the crystalline structure by Bragg's X-ray diffractometer(L4)
- **Apply** powder method to measure the crystallinity of a solid (L4)

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu&Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and PoonamTandon, Oxford University press.

Reference Books:

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
4. Engineering Physics – M.R. Srinivasan, New Age Publications

Course Title	COMMUNICATIVE ENGLISH (Common to all branches)				B. Tech. II Sem *(Common to All Branches)*		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
2024203	**HSME**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hours					**End Exam Duration: 3Hours**			

Course Objectives:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes

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

COURSE OUTCOMES	
CO1	Retrieve the knowledge of basic grammatical concepts
CO2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO3	Apply grammatical structures to formulate sentences and correct word forms
CO4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO6	Create a coherent paragraph interpreting a figure/graph/chart/table

Unit 1

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general

questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing :**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech; Word formation, synonyms and antonyms; Idioms and Phrases; phrasal verbs.

Learning Outcomes

At the end of the module, the learners will be able to

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- Ask and answer general questions on familiar topics and introduce oneself/others
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- Form sentences using proper grammatical structures and correct word forms

Unit 2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.**Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Sentence structure; articles; Tenses; Prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

- Comprehend short talks on general topics
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- Understand the use of cohesive devices for better reading comprehension
- Write well structured paragraphs on specific topics
- Identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

Lesson: A City Night Peace - Oliver Goldsmith

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.**Writing:** Summarizing, Paragraph Writing

Grammar and Vocabulary: Voice; Reported Speech; Degrees of Comparison, Subject with agreement.

Learning Outcomes
At the end of the module, the learners will be able to

- Comprehend short talks and summarize the content with clarity and precision
- Participate in informal discussions and report what is discussed
- Infer meanings of unfamiliar words using contextual clues
- Write summaries based on global comprehension of reading/listening texts
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit4
Lesson: Being Rich, Being Good - ChetanBhagat
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Letter Writing: Official Letters/Report Writing
Grammar and Vocabulary: Information Transfer; Simple, Compound and Complex sentences; Question Tags

Learning Outcomes
At the end of the module, the learners will be able to

- Infer and predict about content of spoken discourse
- Understand verbal and non-verbal features of communication and hold formal/informal conversations
- Interpret graphic elements used in academic texts
- Produce a coherent paragraph interpreting a figure/graph/chart/table
- Use language appropriate for description and interpretation of graphical elements

Unit 5

Lesson: Politics and the English Language: George Orwell
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Reading: Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences.
Grammar and Vocabulary: Reading Comprehension; Dialogue Writing; Common Errors.
Learning Outcomes
At the end of the module, the learners will be able to

- Take notes while listening to a talk/lecture and make use of them to answer questions
- Make formal oral presentations using effective strategies
- Comprehend, discuss and respond to academic texts orally and in writing

- Produce a well-organized essay with adequate support and detail
- Edit short texts by correcting common errors

Prescribed Text:

Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books

- Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
- Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
- Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011
- Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
- Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

Web links

www.englishclub.com
www.easyworldofenglish.com
www.languageguide.org/english/
www.bbc.co.uk/learningenglish
www.eslpod.com/index.html
www.myenglishpages.com

Course Title	Material Science					B. Tech. ME IIND SEM		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
2003204	**ESC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

- To teach the principles of physical metallurgy, i.e. crystallography of metals, constitution of alloys, phase diagrams.
- Expose commercially important metals and alloys (both ferrous and non ferrous) with engineering constraints.
- Explain the methods to change the properties of materials through heat treatment processes
- Familiarize properties and applications of ceramics, polymers and composite materials.
- Demonstrate the fundamental properties of nano-materials and their applications.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the importance of iron - iron carbide phase diagram
CO 2	Understand the importance of non-ferrous metals and alloys in engineering applications.
CO 3	Explain the principles of binary phases
CO 4	Utilize nonferrous metals and alloys in engineering.
CO5	Apply heat treatment to different applications.

UNIT I

Structure of Metals: Crystal Structures: Unit cells, Metallic crystal structures, Imperfection in solids: Point, Line, interstitial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Constitution of Alloys: Necessity of Alloying, substitutional and interstitial solid solutions-Phase diagrams: Interpretation of binary phase diagrams and microstructure development;

eutectic, peritectic, peritectoid and monotectic reactions. Iron-Iron-carbide diagram and microstructural aspects of ferrite, cementite, austenite, ledeburite, and cast iron.

Learning Outcomes:

At the end of this unit the student will be able to

- understand the importance of material science in engineering.(L2)
- recall the definitions and terminology of crystallography. (L1)
- distinguish metals and alloys. (L4)
- make use of the principles of construction of binary phase diagrams. (L3)
- identify various invariant reactions in binary phase diagrams. (L3)
- know the concept of metallography in studying the microstructures of metals and alloys. (L2)

UNIT II

Steels:

Plain carbon steels, use and limitations of plain carbon steels. AISI& BIS classification of steels.

Classification of alloys steels. Microstructure, properties and applications of alloy steels-stainless steels and tool steels.

Cast irons:

Microstructure, properties and applications of white cast iron, malleable cast iron, grey cast iron, nodular cast iron and alloy cast irons.

Learning Outcomes:

At the end of this unit the student will be able to

- Classify various types of steels, their properties and applications. (l2)
- Identify various types of cast irons, their properties and applications. (l3)
- Compare steels and cast irons and their limitations in applications. (l3)

UNIT III

Heat Treatment of Steels: Annealing, tempering, normalizing and hardening, isothermal transformation diagrams for Fe-Fe_3C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructures and properties- austempering, martempering, case hardening - carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, and vacuum and plasma hardening

Learning Outcomes:

At the end of this unit the student will be able to

- Know the influence of heat treatment in modification of properties of steels. (l2)
- Develop a heat treatment cycle based on properties required. (l3)
- Comprehend the principles of surface hardening methods. (l2)

UNIT IV

Non-ferrous Metals and Alloys: Microstructure, properties and applications of copper, aluminium, titanium, nickel and their alloys. Study of Al-Cu phase diagram

Learning Outcomes:

At the end of this unit the student will be able to

- (l2)
- Demonstrate various properties and applications of non-ferrous alloys. (l4)
- Differentiate between hardening of ferrous and non-ferrous alloys. (l4)

UNIT V

Ceramics, Polymers and Composites: Structure, properties and applications of ceramics, polymers and composites. Introduction to super alloys and nanomaterials.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the properties of ceramics and their applications. (l2)
- Summarize the properties of polymers and composites and their use. (l2)
- Interpret the properties of nano materials and their applications. (l2)
- Identify the difference between the micro and nano scale materials and their uses. (L3)

Text Book(s)

1. V.Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004.
2. R.Balasubramaniam, Callister's Material Science and Engineering, 2/e, Wiley India, 2014.

References

1. Y. Lakhtin, Engineering Physical Metallurgy, University Press of the Pacific, 2000.
2. S.H.Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997.
3. L.H.VanVlack, Elements of Material Science and Engineering, 6/e, Pearson Education, 2008.
4. George E.Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.

Course Title	Engineering Drawing					B. Tech. ME IIND SEM		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
2003205	**ESC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		1	0	2	2	30	70	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

- Bring awareness that Engineering Drawing is the Language ofEngineers.
- Familiarize how industry communicates technicalinformation.
- Teach the practices for accuracy and clarity in presenting the technicalinformation.
- Develop the engineering imagination essential for successfuldesign.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Draw various curves applied in engineering..
CO 2	Show projections of solids and sections graphically.
CO 3	Draw the development of surfaces of solids.
Co4	Know draw orthographic and isometric projections
CO5	Evaluate different methods of perspective view.

Unit: I

Introduction to Engineering Drawing: Principles of Engineering Drawing and its Significance-Conventions in drawing-lettering - BIS conventions.

a)Conic sections including the rectangular hyperbola- general methodonly,

b) Cycloid, epicycloids andhypocycloid c) Involutes

Unit: II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliaryviewsmethod.

Unit: III

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Unit: IV

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Unit: V :perspective projection –applications of perspective view –terminology of perspectiveview- methods of drawing perspective view-simple problems.

Text Books:

1. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers,2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right,2009
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers,2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education,2009
4. K.C.John, Engineering Graphics, 2/e, PHI,2013
5. BasantAgarwal&C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Additional Sources

1. Youtube: http-sewor, Carleton. cag,kardos/88403/drawings.html conic sections-online, red woods.edu

Note: The distribution of marks shall be 30 for internal evaluation and 70 for end examination.. In the Internal evaluation 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the submissions prepared in the class. Further, there shall be two midterm exams in a Semester evenly distributed over the syllabi for 15 marks. Total internal marks for midterm exams will be evaluated by giving 80% weightage to the better mid exam and 20% to the other mid examination. The sum of day to day evaluation and the internal test marks will be the final internal marks for the subject.

Course Title	Engineering Drawing Lab				B. Tech. ME IIND SEM			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
2003206	**ESC**	0	0	2	1	40	60	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- Bring awareness that Engineering Drawing is the Language ofEngineers.
  - Familiarize how industry communicates technicalinformation.
  - Teach the practices for accuracy and clarity in presenting the technicalinformation.
  - Develop the engineering imagination essential for successfuldesign.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	use computers as a drafting tool
CO 2	draw isometric drawings using CAD packages.
CO 3	Analyze orthographic drawings using CAD packages

- Instruct the utility of drafting &modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3Dmodeling.
- Instruct graphical representation of machinecomponents.

Computer Aided Drafting:

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets,arrays,dimensions.

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Text Books:

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

Reference Books:

1. T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3. LinkanSagar, BPB Publications, Auto Cad 2018 Training Guide.
4. K.C.John, Engineering Graphics, 2/e, PHI,2013
5. BasantAgarwal&C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Additional Sources

1. Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu

Course Title	COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)					I st B. Tech. ME		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
2024208	**HSME**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		0	0	3	1.5	40	60	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Listening and repeating the sounds of English Language
CO 2	Understand the different aspects of the English language
CO 3	Apply communication skills through various language learning activities
CO 4	Analyze the English speech sounds, stress, rhythm, intonation and syllable
CO 5	Evaluate and exhibit acceptable etiquette essential in social and professional

Unit 1

- Listening Skills
- Phonetics
- Introducing oneself

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

- Describing objects
- JAM / Interpretation of Hypothetical Situations
- Role play

Learning Outcomes
At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics

Unit 3

- Hypothetical situations (If…….. were)
- Elocution
- TED talks videos

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions

Unit4

- Visual Description
- Situational conversations

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- understand non-verbal features of communication

Unit 5

- Oral Presentations
- PowerPoint presentations

Learning Outcomes
At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- help in overcoming the fear of facing people.

Suggested Software

- Orell
- Walden Infotech
- Young India Films

- K-Van solutions

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

www.esl-lab.com

www.englishmedialab.com

www.englishinteractive.net

Course Title	Engineering Physics Lab					I stB. Tech. ME		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
20EP207	**BSC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		0	0	3	1.5	40	60	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Operate various optical instruments
CO 2	estimate wavelength of laser and particles size using laser
CO 3	evaluate the acceptance angle of an optical fiber and numerical aperture
CO 4	estimate the susceptibility and related magnetic parameters of magnetic materials
CO 5	plot the intensity of the magnetic field of circular coil carrying current with distance

List of Engineering Physics Experiments

1. Determine the thickness of the wire using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire usingwedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's ring method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate theradius of curvature of the lens (L2)

Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)

Plotsthe square of the diameter of a ring with no. of rings (L3)

3. Determination of wavelength by plane diffraction grating method

Experimental outcomes:

Operates optical instrument like spectrometer. (L2)

Estimate the wavelength of the given source (L2)

Identifies the formation of grating spectrum due diffraction. (L2)

4. Determination of dispersive power of prism.

Experimental outcomes:

Operates optical instrument like spectrometer. (L2)

Estimate the refractive index and dispersive power of the given prism (L2)

Identifies the formation of spectrum due to dispersion. (L2)

5. Determination of wavelength of LASER light using diffraction grating.

Experimental outcomes:

Operates various instrument (L2)

Estimate the wavelength of laser source (L2)

Identifies the formation of grating spectrum due diffraction. (L2)

6. Determination of particle size using LASER.

Experimental outcomes:

Operates various instrument (L2)

Estimate the Particles size using laser (L2)

Identifies the application of laser (L2)

7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate thenumerical aperture and acceptance angle of a given optical fiber. (L2)

Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)

8. Determination of dielectric constant by charging and discharging method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the dielectric constant of the given substance. (L2)

Identifies the significance of dielectric constant in various devices. (L2)

9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the magnetic field along the axis of a circular coil carrying current. (L2)

Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate thehysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)

Classifies the soft and hard magnetic material based on B-H curve. (L2)

Plotsthe magnetic field H and flux density B (L3)

11. Determination of ultrasonic velocity in liquid (Acoustic grating)

Experimental outcomes:

Operates various instruments. (L2)

Estimate the velocity of ultrasonic waves in liquids. (L2)

Illustrates the basic applications of ultrasonics. (L3)

12. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

Experimental outcomes:

Operates various instruments. (L2)

Estimate therigidity modules of a given wire (L2)

Plots length of the pendulum (l) with time period T^2 (L3)

Note: - In the following list of experiments, out of 12 experiments any 10 experiments (minimum 8) must be performed in a semester.

Course Title	Material Science Lab				B. Tech. IST ME			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
2003209	**ESC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		0	0	3	1.5	40	60	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

1. To understand the microstructure and hardness of engineering materials.
2. To explain grain boundaries and grain sizes of different engineering materials.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Differentiate various microstructures of ferrous and non-ferrous metals and alloys
CO 2	Differentiate various microstructures of ferrous and non-ferrous metals and alloys.
CO 3	Visualize grains and grain boundaries
CO 4	Importance of hardening of steels
CO5	Differentiate hardness of super alloys, ceramics and polymeric materials

List of Experiments:

1. Metallography sample preparation
2. Microstructure of pure metals – Iron, copper and aluminum as per ASTM standards
3. Microstructure of low carbon steel, mild steel and high carbon microstructure of cast irons.
4. Microstructure of non-ferrous alloys – aluminum, copper, titanium, nickel and their alloys.
5. Hardenability of steels by Jominy End Quench Test.
6. Microstructure of heat treated steels.
7. Hardness of various untreated and treated steels.
8. Microstructure of ceramics, polymeric materials.
9. Microstructure of super alloy and nano-materials.
10. Hardness of ceramics, super alloys, nano-materials and polymeric materials (one sample on each)

Course Title	UNIVERSAL HUMAN VALUES				B. Tech. IST ME		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
20MC211	**MC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	0	0	0	0
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- To understand the moral values that ought to guide the Management profession and resolve the moral issues in the profession,
- To justify the moral judgment concerning the profession.
- To develop a set of beliefs, attitudes, and habits that engineers should display concerning morality.
- To create an awareness on Management Ethics and Human Values.
- To inspire Moral and Social Values and Loyalty.
- To appreciate the rights of others.

This course deals with professional ethics which includes moral issues and virtues, social responsibilities of an engineer, right qualities of moral leadership

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	develop appropriate technologies and management patterns to create harmony in professional and personal life.
CO 2	ensure students sustained happiness through identifying the essentials of human values and skills.
CO 3	get awareness of types of ethical challenges and dilemmas confronting members of a range of professions (business, media, police, law, medicine, research)
CO 4	bring to bear ethical analysis and reasoning in the light of normative ethics frameworks on a selection of ethical challenges and dilemmas across the chosen range of
CO 5	relate ethical concepts and materials to ethical problems in specific professions and professionalism

UNIT I : HUMAN VALUES

Morals, Values and Ethics - Integrity - Trustworthiness - Work Ethics - Service Learning - Civic Virtue - Respect for others - Living Peacefully - Caring - Sharing - Courage - Value Time - Co-operation - Commitment - Empathy - Self-confidence - Spirituality - Character.

UNIT - II : ENGINEERING ETHICS

Senses of Engineering Ethics – Variety of Moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Consensus and Controversy – Professions and Professionalism – Professional ideals and virtues.

UNIT – III : ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and Risk – Assessment of Safety and Risk – Risk benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Chernobyl Case and Bhopal Case studies.

UNIT- IV: VALUE EDUCATION

Self- exploration- its content and process- natural acceptance- Happiness and Prosperity- Understanding Human relations.

UNIT - V: HOLISTIC PERCEPTION OF HARMONY

Understanding the Harmony in the society- -Universal order- critical appreciation of Human values- Justice, Trust.

TEXT BOOKS :

1. Mike martin and Roland Schinzinger.“ Ethics in Engineering ’’, McGrow Hill, New York 2005
2. Charles E Harris. Michael S Pritchard and Michael J Rabins.“ Engineering Ethics – Concepts and Cases ”, Thompson Learning 2000.
3. R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1