JHARKHAND RAI UNIVERSITY

MECHANICAL ENGINEERING

B.Tech

SYLLABUS 2018-2022

SEMESTER III

Kamre | Ratu Road | Ranchi | Jharkhand

Web : www.jru.edu.in | **Email :** info@jru.edu.in

BATCH 2018-2022												
B.Tech in MECHANICAL ENGINEERING												
Choice Based Credit System												
SEMESTER III												
S. No.	**CATEGORY**	**CODE**	**COURSE TITLE**	**Periods**			**Evaluation Scheme**				**Subject Total**	**Credit**
				L	**T**	**P**	**Assignment**	**TA**	**Total**	**ESE**		
1	Basic Science Course	7BSC201	Mathematics-III	3	1	0	20	10	30	70	100	4
2	Basic Science Course	BSC202	Biology for Engineers	3	0	0	20	10	30	70	100	3
3	Basic Science Course	7BSC203	Physics-II	3	1	0	20	10	30	70	100	4
4	Engineering Science Course	7ESC202	Basic Electronics Engineering	3	1	0	20	10	30	70	100	4
5	Engineering Science Course	7ESC201	Engineering Mechanics	3	1	0	20	10	30	70	100	4
6	Professional Core Courses	7PCCME201	Thermodynamics	3	1	0	20	10	30	70	100	4
7	Humanities and Social Sciences including Management Courses	HSMC201	Effective Technical Communication	**3**	**0**	**0**	**20**	**10**	**30**	**70**	**100**	**3**
PRACTICAL /SESSIONAL												
NA												
										TOTAL	**700**	**26**

** NOTE: Qualifying Non Credit Course

Note- Upto 20% Credit earn through MOOC (SWAYAM)

Subject Code	Subject	L	T	P	C
7BSC203	Physics-II	3	1	0	4

Course Objectives: The objective of this course is to equip the students with standard concepts of Physics and applications of Physics.

- To understand the concept of various types of motions and waves.
- Detail study of various types of Laws and Optical Phenomena.
- To understand different Phenomena of Physics.
- Detail study of Laser, types of Laser and applications of Laser.

Module 1: Simple harmonic motion, damped and forced simple harmonic oscillator Mechanical and electrical simple harmonic oscillators, energy decay in a damped harmonic oscillator steady state motion of forced damped harmonic oscillator, power absorbed by oscillator

Module 2: Non-dispersive transverse and longitudinal waves in one dimension and introduction to dispersion
Transverse wave on a string, the wave equation on a string, Harmonic waves, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves. Waves with dispersion, water waves, superposition of waves, wave groups and group velocity.

Module 3 The propagation of light and geometric optics laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's Law, total internal reflection, Mirrors and lenses and optical instruments based on them.

Module 4 Wave optics
Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer,Mach-Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

Module 5 Lasers
Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne), solid-state lasers (ruby Laser).Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

Course Outcomes: After studying the course, the student will be able to:

- Apply Knowledge of Physics in science and engineering.
- Undergo principles of optics and modern physics to evaluate engineering properties of materials.
- Design and conduct experiments, as well as to analyze and interpret data.
- Function on multidisciplinary teams.
- Identify, formulate and solve engineering problems.

Text Books

- Ian G. Main, Oscillations and waves in physics.
- H.J. Pain, The physics of vibrations and waves.
- E. Hecht, Optics (iv)A. Ghatak,Optics.
- O. Svelto, Principles of Lasers.

Reference Books

- R.K.Gaur & S.L. Gupta, Engineering Physics.
- G.S. Raghuvanshi, Engineering Physics.

- Brij Lal & Subramanyam, A Textbook of Optics.

Subject Code	Subject	L	T	P	C
7BSC201	Mathematics- III	3	1	0	4

Course Objectives:

- To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering.
- To provide an overview of probability and statistics to engineers.

Contents:

Module 1 Complex Variable – Differentiation:
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Module 2 Complex Variable – Integration:
Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Module 3 Probability
Probability spaces, conditional probability, independence, Bayes' rule, Discrete & Continuous random variables and their properties, Independent random variables, the multinomial distribution, Probability distributions: Binomial, Poisson and Normal distributions, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

Module 4 Statistics
Basic Statistics, Measures of Central tendency: Moments, Skewness and Kurtosis, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

Course Outcomes: After studying the course, the student will be able to

- Apply the fundamental concepts of Ordinary Differential Equations and Partial Differential Equations and the basic numerical methods for their resolution.
- Solve the problems choosing the most suitable method.
- Understand the difficulty of solving problems analytically and the need to use numerical approximations for their resolution.
- Use computational tools to solve problems and applications of Ordinary Differential Equations and Partial Differential Equations.
- Formulate and solve differential equation problems in the field of Industrial Organization Engineering.
- Use an adequate scientific language to formulate the basic concepts of the course.
- The tools of functions of a complex variable that are used in various techniques dealing engineering problems. They can also formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.

Text Books:

- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,

2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
- W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India,2009.
- S. L. Ross, Differential Equations, 3rd Ed., Wiley India,1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
- E. L. Ince, Ordinary Differential Equations, Dover Publications,1958.

Reference Books:

- J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010.

Subject Code	Subject	L	T	P	C
BSC202	Biology for Engineers	3	0	0	3

Course Objective:

- To understand Biological concepts from an engineering perspective.
- To understand the inter-connection between biology and future technologies.
- To motivate technology application for biological and life science challenges.

Module 1 Introduction

Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.

Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18^{th}Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.

Module 2 Classification

Purpose: To convey that classification per seis not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted.

Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure-prokaryotes or eukaryotes. (c) energy and Carbon utilization - Autotrophs,heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M.musculus

Module 3 Genetics

Purpose: To convey that " Genetics is to biology what Newton's laws are to Physical Sciences"

Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.

Module 4 Biomolecules

Purpose: To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine

Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA.Two carbon units and lipids.

Module 5 Enzymes

Purpose: To convey that without catalysis life would not have existed on earth Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyzereactions. Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis.

Module 6 Information Transfer

Purpose: The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.

Module 7 Macromolecular analysis

Purpose :How to analyses biological processes at the reductionistic level. Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

Module 8 Metabolism

Purpose: The fundamental principles of energy transactions are the same in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy.

Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO2+ H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge

Module 9 Microbiology

Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

Course Outcomes

After studying the course, the student will be able to:

- Describe how biological observations of 18th Century that lead to major discoveries.
- Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological.
- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to off spring.
- Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine.
- Classify enzymes and distinguish between different mechanisms of enzyme action.
- Identify DNA as a genetic material in the molecular basis of information transfer.
- Analyze biological processes at the reductionist level.
- Apply thermodynamic principles to biological systems.
- Identify and classify microorganisms.

Text books:

- Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd.
- Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
- Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company.

Reference books:

- Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freemanand company, Distributed by Satish Kumar Jain for CBS Publisher.
- Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm,C. BrownPublishers.
- Biology for Engineers by G K Suraish kumar.

Subject Code	Subject	L	T	P	C
7ESC202	Basic Electronics Engineering	3	1	0	4

Course Objectives:

- To provide an overview of electronic device components to Mechanical engineering students.
- To give knowledge of some basic electronic components and circuits.
- To introduce basics of diode and transistor circuits.
- To understand working of some I C based circuits.
- To study logic gates and their usage in digital circuits.
- To expose the students to working of some power electronic devices, transducers and application of transducers.
- To introduce basic aspect of electronic communication systems.

Module 1

Semiconductor Devices and Applications: Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator. Regulated power supply IC based on 78XX and 79XX series, Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frequency response and bandwidth.

Module 2

Operational amplifier and its applications: Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

Module 3

Timing Circuits and Oscillators: RC-timing circuits, IC 555 and its applications as a stable and mono-stable multi-vibrators, positive feedback, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator.

Module 4

Digital Electronics Fundamentals :Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K-map, Logic ICs, half and full adder/subtractor, multiplexers, de-multiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.

Module 5

Electronic Communication Systems: The elements of communication system, IEEE frequency spectrum, Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and block diagram of GSM system.

Course Outcomes:

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

- Understand the principles of semiconductor devices and their applications.
- Design an application using Operational amplifier.
- Understand the working of timing circuits and oscillators.
- Understand logic gates, flip flop as a building block of digital systems.

- Learn the basics of Electronic communication system.

Text Books:

- Floyd ," Electronic Devices" Pearson Education 9th edition,2012.
- R.P. Jain , "Modern Digital Electronics", Tata McGraw Hill, 3rdEdition,2007.
- Frenzel, "Communication Electronics: Principles and Applications", Tata McGraw Hill, 3rdEdition,2001

Reference Books:

- J.B. Gupta, Basic Electrical Engineering, Kataria & Sons.
- Kothari & Nagrath, Basic Electrical Engineering, TMH.
- V. Mittle & Arvind Mittal, Basic Electrical Engineering, TMH.
- Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication.
- Chakrabarti,Nath & Chanda, Basic Electrical Engineering, TMH.
- C.L. Wadhwa, Basic Electrical Engineering, Pearson Education.

Subject Code	Subject	L	T	P	C
7ESC201	Engineering Mechanics	3	1	0	4

Course Objective:

- To give students practice in applying their knowledge of mathematics, science, and engineering and to expand this knowledge into the vast area of "rigid body Mechanics".
- To enhance students' ability to design by requiring the solution of open ended problems.
- To prepare the students for higher level courses such as courses in Mechanics of Solids, Mechanical Design and Structural Analysis.

Proposed Syllabus

Module 1*:* Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3- D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

Module 2*:* Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Module 3*:* Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines;

Module 4*:* Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia-Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere,Hook.

Module 5*:* Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

Module 6*:* Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work- Kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

Module 7: Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation;

Module 8: Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

Upon successful completion of the course, student should be able to:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
- Apply basic knowledge of maths and physics to solve real-world problems Understand measurement error, and propagation of error in processed data.
- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
- Understand basic dynamics concepts – force, momentum, work and energy; Understand and be able to apply Newton's laws of motion.
- Understand and be able to apply other basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.
- Extend all of concepts of linear kinetics to systems in general plane motion (applying Euler's Equation and considering energy of a system in general plane motion, and the work of couples and moments of forces).
- Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy and
- Attain an introduction to basic machine parts such as pulleys and mass-spring systems.

Text Books:

- Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
- F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, VolII, – Dynamics, 9th Ed, Tata McGraw Hill
- R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
- Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
- Shanes and Rao (2006), Engineering Mechanics, Pearson Education

Reference Books:

- Hibler and Gupta (2010),Engineering Mechanics (Statics, Dynamics) by Pearson Education
- Reddy Vijay kumar K. and K. Suresh Kumar(2010), Singer's Engineering Mechanics
- Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
- Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
- Tayal A.K. (2010), Engineering Mechanics, Umesh Publications

Subject Code	Subject	L	T	P	C
7PCCME201	Thermodynamics	3	1	0	4

Course Objectives:

- To learn about work and heat interactions, and balance of energy between system and its surroundings.
- To learn about application of Ist law to various energy conversion devices to evaluate the changes in properties of substances in various processes.
- To understand the difference between high grade and low grade energies and II law limitations on energy conversion.

Module 1

Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work-Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work.

Module 2

Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; Various Thermometers- Definition of heat; examples of heat/work interaction in systems- First Law for Cyclic & Non- cyclic processes; Concept of total energy E ; Demonstration that E is a property; Various modes of energy, Internal energy and Enthalpy.

Module 3

Definition of Pure substance, Ideal Gases and ideal gas mixtures, Real gases and real gas mixtures, Compressibility charts- Properties of two phase systems - Const. temperature and Const. pressure heating of water; Definitions of saturated states; P-v-T surface; Use of steam tables and R134a tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

Module 4

First Law for Flow Processes - Derivation of general energy equation for a control volume; Steady state steady flow processes including throttling; Examples of steady flow devices; Unsteady processes; examples of steady and unsteady I law applications for system and control volume.

Module 5

Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.

Module 6

Clausius inequality; Definition of entropy S ; Demonstration that entropy S is a property; Evaluation of S for solids, liquids, ideal gases and ideal gas mixtures undergoing various processes; Determination of s from steam tables- Principle of increase of entropy; Illustration of processes in T-s coordinates; Definition of Isentropic efficiency for compressors, turbines and nozzles-Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume. Energy balance equation and Energy analysis.

Thermodynamic cycles - Basic Rankine cycle; Basic Brayton cycle; Basic vapor compression cycle and comparison with Carnot cycle.

Course Outcomes: After completing this course,

- The students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions.
- Students can evaluate changes in thermodynamic properties of substances.
- The students will be able to evaluate the performance of energy conversion devices.
- The students will be able to differentiate between high grade and low grade energies.

Text Books:

- Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6thEdition, Fundamentals of Thermodynamics, John Wiley and Sons.
- Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
- Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.

Reference Books:

- Engineering thermodynamics by Enrico Fermi (Dover book).
- Engineering Thermodynamics by Yunas A. Cengel, and Cimbala (Publisher TMH).
- Engineering Thermodynamics through examples Y. V. C. Rao(Universities press).

Subject Code	Subject	L	T	P	C
HSMC201	Effective Technical Communication	3	0	0	3

Course Objective:

The objectives of the course are:

- To teach students the principles of technical communication for their academic and professional needs, focusing on essential written and oral skills for presenting technical information effectively.
- To make the students aware of the basic principles, which include the analysis of context, purpose and audience.
- To enhance fundamentals of technical report writing.
- To equip their effective technical presentations.

Module 1: Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Module 2: Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Module 3: Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Module 4: Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, eventreport.

Module 5: Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Course Outcome:

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

- Develop an effective technical report, displaying the ability to employ appropriate rhetorical strategies.
- Write an effective technical abstract, displaying the ability to select important pieces of information and synthesize them into an accurate preview of the report.
- Illustrate and examine the knowledge of ethical aspects of Engineering.
- Communicate in diverse formal situations taking place in organization.

Text/Reference Books:

- David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York,

2004

- Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003.(ISBN 0312406843)
- Shiv Khera, You Can Win, Macmillan Books, New York,2003.
- Raman Sharma, Technical Communications, Oxford Publication, London,2004.
- Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004.(ISBN: 07828357-4)
- Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH NewDelhi 2002. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN0402