BUNDELKHAND INSTITUTE OF ENGINEERING & TECHNOLOGY, JHANSI

UTTAR PRADESH

EVALUATION SCHEME

FOR

B.TECH. 1st YEAR

[Civil Engineering, Chemical Engineering, Computer Science & Engineering, Electronics & Communication Engineering, Mechanical Engineering, Information Technology and Artificial Intelligence & Machine Learning]

[Effective from Session: 2025-26]

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[Civil Engineering, Chemical Engineering, Computer Science & Engineering, Electronics & Communication Engineering, Mechanical Engineering, Information Technology and Artificial Intelligence & Machine Learning]

Evaluation Scheme
Effective in Session -2025-26

Sr. No.	Subject Code	Subject Name	Type	Category	Period/Week			Sessional Component		Evaluation Scheme			Credit
										Sessional (SW)	ESE	Total	
					L	T	P	CT	TA	CT+TA	TE/PE	SW+ESE	C
1.	JAS101/ JAS 102	Engineering Physics/ Engineering Chemistry	T	BS	3	1	0	20	10	30	70	100	4
2.	JAS 103	Engineering Mathematics I	T	BS	3	1	0	20	10	30	70	100	4
3.	JEE 101/ JEC 101	Fundamentals of Electrical Engineering/ Fundamentals of Electronics Engineering	T	ES	3	1	0	20	10	30	70	100	4
4.	JCS 101/ JME 101	Programming of Problem Solving/ Fundamentals of Mechanical Engineering	T	ES	3	1	0	20	10	30	70	100	4
5.	JAS 104/ JAS 105	Environment and Ecology/Soft Skills	T	BS/HS	3	0	0	20	10	30	70	100	3
6.	JAS 151/ JAS 152	Engineering Physics Lab /Engineering Chemistry Lab	P	ES	0	0	3	0	50	50	50	100	1
7.	JEE 151/ JEC 151	Fundamentals of Electrical Engineering Lab/ Fundamentals of Electronics Engineering Lab	P	BE	0	0	3	0	50	50	50	100	1
8.	JCS 151/ JAS 155	Programming for Problem Solving Lab/ English Language Lab	P	ES/HS	0	0	3	0	50	50	50	100	1
9.	JCE 151/ JWS 151	Engineering Graphics and 3D Modeling Lab/ Workshop Practice Lab	P	ES	0	1	3	0	50	50	50	100	2
					15	5	12			230	470	900	24

3-Weeks Student Induction Program (SIP) in the Beginning of the Session

SEMESTER-II

Sr. No.	Subject Code	Subject Name	Type	Category	Period/Week			Sessional Component		Evaluation Scheme			Credit
					L	T	P	CT	TA	Sessipnal (SW) Total	ESE TE/PE	Total SW+ESE	C
1.	JAS202/ JAS 201	Engineering Chemistry/ Engineering Physics	T	BS	3	1	0	20	10	30	70	100	4
2.	JAS 203	Engineering Mathematics II	T	BS	3	1	0	20	10	30	70	100	4
3.	JEC 201 /JEE 201	Fundamentals of Electronics Engineering/ Fundamentals of Electrical Engineering	T	ES	3	1	0	20	10	30	70	100	4
4.	JME 201 / JCS 201	Fundamentals of Mechanical Engineering/ Programming of Problem Solving	T	ES	3	1	0	20	10	30	70	100	4
5.	JAS 205/ JAS 204	Soft Skills /Environment and Ecology	T	HS/ BS	3	0	0	20	10	30	70	100	3
6.	JAS 252/ JAS 251	Engineering Chemistry Lab/ Engineering Physics Lab	P	ES	0	0	3	0	50	50	50	100	1
7.	JEC251/ JEE 251	Fundamentals of Electronics Engineering Lab/Fundamentals of Electrical Engineering Lab	P	BE	0	0	3	0	50	50	50	100	1
8.	JAS 255/JCS 251	English Language Lab/ Programming for Problem Solving Lab	P	HS/ ES	0	0	3	0	50	50	50	100	1
9.	JWS 251/JCE 251	Workshop Practice Lab/Engineering Graphics and 3D Modeling Lab	P	ES	0	1	3	0	50	50	50	100	2
10.	JVA 251/JVA 252	Sports & Yoga I/ NSS & NCC-I	P	VA	0	0	3	0	50	*50		*50	0
					15	5	12			---	---	900+ *50	24

*Compulsory Qualifying Audit Course

Summer Internship (4-weeks) / NPTEL Course (4-weeks) during Summer Break after Semester -2 and same will be assessed/evaluated in Semester-3

Abbreviations Used:

T: Theory Course, P: Practical

Course BS: Basic Science Course,

ES: Engineering Science Course,

HS: Humanities and Social Science

Course, VA: Value Added Course

PC: Professional Core Course

JAS 101/ JAS 201: ENGINEERING PHYSICS

Content	Contact Hours
Unit-1: Quantum Mechanics	**10**
Inadequacy of classical mechanics. Plank's theory of Black body radiation (qualitative), Compton effect, Photoelectric effect, de-Broglie concept of matter waves, Davisson and Germer experiment, Phase velocity and Group velocity, Heisenberg principle and its applications, Time-dependent and time-independent Schrodinger wave equations, Physical interpretation of wave function, Particle in a one-dimensional box.	
Unit-2: Electromagnic Field Theory	**8**
Basic concept of Stokes theorem & Divergence theorem and their physical significance, Continuity equation for current density, Displacement current, Maxwell equations in integral and differential form, Maxwell equations in vacuum and in conducting medium, Plane electromagnetic waves in vacuum and their transverse nature, Poynting vector and Poynting theorem.	
Unit-3: Wave Optics	**9**
Coherent sources, Interference in uniform and wedge shaped thin films, Necessity of extended sources, Newton's Ring and its applications, Introduction of diffraction, Fraunhoffer diffraction at single slit and double slit, Absent spectra, Resolving power, Rayleigh's criterion of resolution, Resolving power of Grating.	
Unit-4: Polarization & Laser	**8**
Polarization: Phenomena of double refraction, Nicol prism, Half-wave plate and quarter-wave plate Production and detection of Plane, circular and elliptical polarized light, Optical activity, Specific rotation. **Laser:** Absorption of radiation, Spontaneous and stimulated emission of radiation, Population inversion, Einstein's Coefficients, Principles of laser action, Solid state laser (Ruby laser) and Gas laser (He-Ne laser), Laser applications.	
Unit-5: Solid State Physics	**9**
Free electron theory of metals, density of states, Origin of energy bands, Fermi energy, distinction between metals, semiconductors and insulators, Intrinsic and extrinsic semiconductors, Hall effect.	

Course Outcomes:
On completion of course the students are able:

CO	CO Statement	Bloom's Level
CO1	To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation	Understanding, Apply
CO2	To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations.	Understanding, Analyze
CO3	To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power.	Apply
CO4	To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser.	Understanding, Apply
CO5	To understand the concept of classical mechanics and types of semiconductors.	Understanding, Apply

JAS 102/JAS 202 ENGINEERING CHEMISTRY

Content	Contact Hours
Unit-1:	**8**
Chemistry of Advanced Materials: **Liquid Crystals;** Introduction, Types and Applications of liquid crystals, Industrially important materials used as liquid crystals. **Graphite and Fullerene;** Introduction, Structure and applications. **Nanomaterials;**Introduction,Preparation,characteristicsofnanomaterialsandapplicationsof nanomaterials,CarbonNanoTubes(CNT), **Green Chemistry:** Introduction, 12 principles and importance of green Synthesis, Green Chemicals, Synthesis of typical organic compounds by conventional and Green route (Adipic acid and Paracetamol), Environmental impact of Green chemistry on society. **Lubricants and Lubrication;** Introduction, Mechanism of lubrication, significance and determination of viscosity and viscosity index, Flash and Fire points, Cloud and pour points, Aniline point, Acid number, Saponification Number, Steam emulsion number and related numerical problems.	
Unit-2:	**8**
Spectroscopic Techniques and Applications: Elementary idea and simple applications of UV,IR and NMR, Numerical problems. **Stereo chemistry:** Optical isomerism in compounds without chiral carbon, Geometrical isomerism, Chiral Drugs.	
Unit-3:	**8**
Electro chemistry and Batteries: Basic concepts of electrochemistry. **Batteries;** Classification and applications of Primary Cells (Dry Cell) and Secondary Cells(Lead Acid battery). **Corrosion:** Introduction to corrosion, Types of corrosion, Cause of corrosion, Corrosion prevention and control, Corrosion issues in specific industries (Power generation, Chemical processing industry, Oil & gas industry and Pulp & paper industries). **Chemistry of Engineering Materials:** **Cement;** Constituents, manufacturing, hardening and setting, deterioration of cement, Plaster of Paris (POP).	
Unit-4:	**8**

Water Technology: Sources and impurities of water, Hardness of water, Boiler troubles, Techniques for water softening (Lime-Soda, Zeolite, Ion Exchange and Reverse Osmosis process), Determination of Hardness and alkalinity, Numerical problems. **Fuels and Combustion:** Definition, Classification, Characteristics of a good fuel, Calorific Values, Gross & Net calorific value, Determination of calorific value by Bomb Calorimeter, Theoretical calculation of calorific value by Dulong's method, Ranking of Coal, Analysis of coal by Proximate and Ultimate analysis method, Numerical problems, Chemistry of Biogas production from organic waste materials and their environmental impact on society.	
Unit-5:	**8**
Materials Chemistry: **Polymers;** Classification, Polymerization processes, Thermosetting and Thermoplastic Polymers, Polymer Blends and Composites, Conducting and Biodegradable e polymers, Preparation, properties, industrial applications of Teflon, Lucite, Bakelite, Kelvar, Dacron, Thiokol, Nylon, Buna N and Buna-S and their environmental impact on society, Specialty polymers. **Organometallic Compounds:** Genera l methods of preparation and applications of Organometallic compounds (R Mg X and LiAlH4).	

COURSE OUTCOMES:

CO-1 Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nan materials, Graphite & Fullerene) as well as the Principles of Green Chemistry.

CO-2 Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry.

CO-3 Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement).

CO-4 Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal.

CO-5 Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.

JAS 103: ENGINEERINGMATHEMATICS-I

Course Objectives:

The objective of this course is to familiarize the graduate engineers with techniques in matrix, calculus, multivariate analysis and vector calculus. It aims to equip the students with standard concepts and tools from intermediate to advance level that will enable themto tackle more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

- The essential tools of matrices, Eigen values and its application in a comprehensive manner.
- To apply the knowledge of differential calculus in the field of engineering.
- To deal with functions of several variables that is essential in optimizing the results of real life problems.
- To apply the concepts of integral calculus in various field of engineering and have basic understanding of Beta and Gamma functions along with the applications of Dirichlet's integral.
- To deal with vector calculus that is required in different branches of engineering to graduate engineer.

Content	Contact Hours
Unit-1:Matrices	**8**
Elementary transformations, Inverse of a matrix, Rank of matrix (Echelon form & Normal form), Solution of system of linear equations, Linear Dependence and Independence of vectors, Eigen Value Problem, Complex Matrices, Hermitian and Skew-Hermitian Matrices, Unitary Matrices, Cayley-Hamilton Theorem and its application, Application of Matrices to Engineering Problems.	
Unit-2:DifferentialCalculus-I	8
Rolle's and Langrage's Mean Value theorem and their applications, Successive Differentiation (n^{th} derivative), Leibnitz theorem, Partial derivatives, Euler's Theorem for Homogeneous functions, Total derivative, Change of independent variables,	
Unit-3:DifferentialCalculus-II	8
Expansion of functions of one and two variables (Taylor's and Maclaurin's theorems), Jacobians, Maxima and Minima of functions of several variables, Lagrange's method of multipliers, Approximation of errors.	
Unit-4:Multiple Integration	8

Introduction to Improper Integrals, Beta and Gama function and their properties, Double integral, Triple integral, Change of order of integration, Change of variables, Dirichlet's integral, Liouville's extensions of Dirichlet's integral, Applications of Double and Triple integrals to determine Area, Volume.	
Unit-5:Vector Calculus	8
Vector Differentiation: Gradient, Divergence, Curl and their physical interpretation, Directional Derivatives, Tangent Plane and Normal Lines, Vector Identities, Laplacian operator and Harmonic functions **VectorIntegration**: Line integral, Surface integral, Volume integral, Green's theorem, Gauss Divergence theorem and Stokes theorem (without proof) and their applications.	

Course Outcomes:

	Course Outcome(CO)	**Bloom's Level**
At the end of this course, the students will be able to:		
CO1	Understand the concepts of rank of matrices to solve the system of linear simultaneous equations and to determine the Eigen values and Eigen vectors	K2&K5
CO2	Remember the concept of differentiation of nth differentiation, Leibnitz theorem along with the differentiation of functions of more than one variables. Also, students will be able to sketch the curves	K1,K5&K6
CO3	Expand the functions in series, to determine the extrema along with determining the functional dependence using Jacobians	K3&K5
CO4	Remember the concepts of Improper integral along with the concepts of integration of functions of more than one variables in evaluating the area and volume.	K1&K4
CO5	Apply the concepts of vector differentiation and vector integration in determining the directional derivative, line integrals, surface integrals and volume integrals.	K3,K4&K5

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

Text Books:

1. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications
3. R. K. Jain & S. R. K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House
4. A. C. Srivatava & P. K. Srivastava, Engineering Mathematics, Vol. I, PHI Learning Pvt Limited

Reference Books:
1. E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons
2. Peter V. O' Neil, Advance Engineering Mathematics, Thomson(Cengage) Learning

3. Maurice D. Weir, Joe Hass, Frank R. Giordano, Thomas, Calculus, Pearson Education
4. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Mc Graw-Hill Publishing Company Ltd
5. D. Poole, Linear Algebra : A Modern Introduction, 2nd Edition Brooks/ Cole

JEE101 / JEE201: FUNDAMENTALS OF ELECTRICAL ENGINEERING

Content	Contact Hours
Unit -1: DC Circuits	6
Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity, unilateral and bilateral elements. Kirchhoff"s laws, Mesh and nodal methods of analysis. DC Network Theorem: Thevenin's, Norton's and Superposition.	
Unit-2: : Steady State Analysis of Single Phase AC Circuits	6
Representation of Sinusoidal waveforms – Average and effective values, Form and peak factors. Analysis of single phase AC Circuits consisting R-L-C combination (Series and Parallel) Apparent, active & reactive power, Power factor. Concept of Resonance in series & parallel circuits, bandwidth and quality factor. Three phase power measurement.	
Unit-3: Transformers	6
Magnetic circuits, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.	
Unit-4: Electrical machines	8
DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems) Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only) Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.	
Unit-5: Electrical Installations	4
Introduction of Switch Fuse Unit (SFU), MCB, ELCB, MCCB, ACB. Types of Wires, Cables and Bus-bars. Fundamentals of earthing and lightning protection. Types of Batteries, Energy meter.	

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Course Outcomes:

	Course Outcome (CO)
CO 1	Apply the concepts of KVL/KCL and network theorems in solving DC circuits.
CO 2	Analyze the steady state behavior of single phase and three phase AC electrical circuits.
CO 3	Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer.
CO 4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
CO 5	Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

Text Books:

1. Ritu Sahdev, "Basic Electrical Engineering", Khanna Publishing House, 2018.
2. P.V. Prasad, S.Sivanagaraju,"Electrical Engineering:Concepts and Applications" Cengage, 2018
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Reference Books:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Pearson India, 1989.

Spoken Tutorial (MOOCs):

1. AC DC Circuit Analysis using NgSpice, Open Source Software (http://spoken-tutorial.org)

JEC101 / JEC201 : FUNDAMENTALS OF ELECTRONICS ENGINEERING

Topics	Contact Hours
Unit-1	**8**
Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical Diodes, Diode Equivalent Circuits, Zener Diodes breakdown mechanism (Zener and avalanche) **Diode Application:** Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits **Special Purpose two terminal Devices:** Light-Emitting Diodes, Photo Diodes, Varactor Diodes, Tunnel Diodes.	
Unit-2	8
Bipolar Junction Transistor: Transistor Construction, Operation, Amplification action, Common Base, Common Emitter, Common Collector Configuration **Field Effect Transistor:** Construction and Characteristic of JFETs. Transfer Characteristic. MOSFET (MOS) (Depletion and Enhancement) Type, Transfer Characteristic.	
Unit-3	8
Operational Amplifiers: Introduction, Op-Amp basic, Practical Op-Amp Circuits (Inverting Amplifier, Non-inverting Amplifier, Unit Follower, Summing Amplifier, Integrator, Differentiator).Differential and Common-Mode Operation, Comparators.	
Unit-4	8
Digital Electronics: Number system & representation, Binary arithmetic, Introduction of Basic and Universal Gates, using Boolean algebra simplification of Boolean function. K Map Minimization upto 6 Variables.	
Unit-5	8
Fundamentals of Communication Engineering: Basics of signal representation and analysis, Electromagnetic spectrum Elements of a Communication System, Need of modulation and typical applications, Fundamentals of amplitude modulation and demodulation techniques. **Introduction to Wireless Communication:** Overview of wireless communication, cellular communication, different generations and standards in cellular communication systems, Fundamentals of Satellite & Radar Communication.	

Course Outcomes:
At the end of this course students will demonstrate the ability to:
1. Describe the concept of PN Junction and devices.
2. Explain the concept of BJT, FET and MOFET.
3. Apply the concept of Operational amplifier to design linear and non-linear applications.
4. Perform number systems conversions, binary arithmetic and minimize logic functions.
5. Describe the fundamentals of communication technologies.

Text Books:

1. Robert L. Boylestand / Louis Nashelsky "Electronic Devices and Circuit Theory", Pearson Education.
2. George Kennedy, "Electronic Communication Systems", McGrawPublication
3. David A. Bell, "Electronic Devices and Circuits", Oxford UniversityPress.
4. Jacob Millman, C.C. Halkias, StayabrataJit, "Electronic Devices and Circuits", McGrawHill.
5. A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.

JCS101/JCS201: PROGRAMMING FOR PROBLEM SOLVING

Content	Contact Hours 3-1-0
Unit-1:	8
Introduction to Components of a Computer System: Memory, Processor, I/O Devices, Storage, Operating System, Concept of Assembler, Compiler, Interpreter, Loader and Linker. **Idea of Algorithm:** Representation of Algorithm, Flowchart, Pseudo Code with Examples, From Algorithms to Programs, Source Code. **Programming Basics:** Structure of C Program, Writing and Executing the First C Program, Syntax and Logical Errors in Compilation, Object and Executable Code, Components of C Language. Standard I/O in C, Fundamental Data types, Variables and Memory Locations, Storage Classes.	
Unit-2:	8
Arithmetic Expressions and Precedence: Operators and Expression Using Numeric and Relational Operators, Mixed Operands, Type Conversion, Logical Operators, Bit Operations, Assignment Operator, Operator precedence and Associatively. **Conditional Branching:** Applying if and Switch Statements, Nesting if and Else and Switch.	
Unit-3:	8
Iteration and Loops: Use of While, do While and for Loops, Multiple Loop Variables, Use of Break, Goto and Continue Statements. **Arrays:** Array Notation and Representation, Manipulating Array Elements, using Multi Dimensional Arrays. Character Arrays and Strings, Structure, union, Enumerated Data types, Array of Structures, Passing Arrays to Functions.	
Unit-4:	8
Functions: Introduction, Types of Functions, Functions with Array, Passing Parameters to Functions, Call by Value, Call by Reference, Recursive Functions. **Basic of searching and Sorting Algorithms:** Searching & Sorting Algorithms (Linear Search, Binary search, Bubble Sort, Insertion and Selection Sort)	
Unit-5:	8
Pointers: Introduction, Declaration, Applications, Introduction to Dynamic Memory Allocation (Malloc, Calloc, Realloc, Free), String and String functions, Use of Pointers in Self-Referential Structures, Notion of Linked List (No Implementation) **File Handling:** File I/O Functions, Standard C Preprocessors, Defining and Calling Macros and Command-Line Arguments.	

Course Outcome:

	Course Outcome(CO)	Bloom's Level
At the End of Course, the Student will be Able to Understand		
CO1	To Develop Simple Algorithms for Arithmetic and Logical Problems.	K_2, K_3
CO2	To Translate the Algorithms to Programs & Execution (inCLanguage).	K_3
CO3	To Implement Conditional Branching, Iteration and Recursion.	K_3
CO4	To Decompose a Problem in to Functions and Synthesize a Complete Program Using Divide and Conquer Approach.	K_4
CO5	To Use Arrays, Pointers and Structures to Develop Algorithms and Programs.	K_2, K_3

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

Text Books:

1. Schaum's Outline of Programming with C by Byron Gottfried, McGraw-Hill
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.
3. Computer Basics and C Programming by V. Rajaraman, PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E. Balaguruswami, McGraw Hill
5. Computer Science-A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg,Thomson,Third Edition,Cengage Learning-2007.
6. Let Us C By Yashwant P. Kanetkar.
7. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison- Wesley, 2006.
8. Programming in C by Kochan Stephen G. Pearson Education–2015.
9. Computer Concepts and Programming in C by D. S. Yadav and Rajeev Khanna, New Age International Publication.
10. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication
11. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
12. Computer Fundamentals and Programming in C by Reema Thareja, Oxford Publication

JME101 / JME201: FUNDAMENTALS OF MECHANICAL ENGINEERING

Course Outcomes:

	The students will be able to	Blooms Level
CO1	Apply the concept of force resolution and stress and strain to solve basic problems	K3
CO2	Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles.	K2
CO3	Explain the concept of thermodynamics, working of refrigerator, heat pump and air conditioner.	K2
CO4	Understand fluid properties, conservation laws and hydraulic machinery used in real life.	K2
CO5	Understand the working principle of different measuring instrument, mechatronics and robotics with their advantages, scope and Industrial application.	K2

S. No.	Content	Contact Hours
1	**Unit -1: Introduction to Mechanics**	8
	Force moment and couple, principle of transmissibility, Varignon's theorem. Resultant of force system- concurrent and non-concurrent coplanar forces, Types of supports (Hinge, Roller) and loads (Point, UDL, UVL), free body diagram, equilibrium equations and Support Reactions. Normal and shear Stress, strain, Hookes' law, Poisson's ratio, elastic constants and their relationship, stress-strain diagram for ductile and brittle materials, factor of safety.	
2.	**Unit-2: Introduction to IC Engines and Electric Vehicles**	8
	IC Engine: Basic definition of engine and Components, Construction and Working of Two stroke and four stroke SI & CI engine, merits and demerits, scavenging process; difference between two-stroke and four stroke IC engines and SI and CI Engines. **Electric vehicles and hybrid vehicles:** Components of an EV, EV batteries, chargers, drives, transmission and power devices. Advantages and disadvantages of EVs. Hybrid electric vehicles, HEV drive train components, advantages of HV.	
3.	**Unit-3: Introduction to Thermodynamics and Refrigeration and Air-Conditioning**	10
	Thermodynamics: Systems, basic laws, entropy and enthalpy **Refrigeration:** Refrigerating effect, Ton of Refrigeration; Coefficient of performance, methods of refrigeration, construction and working of domestic refrigerator, concept of heat pump. **Air-Conditioning:** Its meaning and application, humidity, dry bulb, wet bulb, and dew point temperatures, comfort conditions, concepts and working of window air conditioner.	
4.	**Unit-4: Introduction to Fluid Mechanics and Applications**	8
	Introduction: Fluids properties, pressure, density, dynamic and kinematic viscosity, specific gravity, Newtonian and Non-Newtonian fluid, Pascal's Law and Continuity Equation. Working principles of hydraulic turbines (Pelton Wheel and Francis)& pumps (Centrifugal and Reciprocating) and their classifications and hydraulic lift.	

5.	Unit-5: Introduction to Measurement , Mechatronics and Robotics	10
	Introduction to Measurement: Concept of Measurement, Error in measurements, Calibration, measurements of pressure(Bourdon Tube Pressure and U-Tube Manometer), temperature(Thermocouple and Optical Pyrometer), mass flow rate(Venturi Meter and Orifice Meter), strain(Bonded and Unbonded Strain Gauge), force (Proving Ring) and torques (Prony Brake Dynamometer); Concepts of accuracy, precision and resolution. **Introduction to Mechatronic Systems:** Evolution, Scope, Advantages and disadvantages of Mechatronics, Industrial applications of Mechatronics, Introduction to autotronics, bionics, and avionics and their applications. Sensors and Transducers: Types of sensors, types of transducers and their characteristics. Introduction to actuation systems and mechanical drive **Introduction to Robotics:** Laws of robotics, robot anatomy its classification based on work volume and type of drive, applications of robots, social economical impact of robots	

Reference Books:

1. Basic Mechanical Engineering, G Shanmugam, S Ravindran, McGraw Hill
2. Basic Mechanical Engineering, M P Poonia and S C Sharma, Khanna Publishers
3. Mechatronics : Principles, Concepts and Applications, Nitaigour Mahalik, McGraw Hill
4. Mechatronics, As per AICTE: Integrated Mechanical Electronic Systems, K.P. Ramachandran, G.K. Vijayaraghavan, M.S. Balasundaram, Wiley India
5. Mechanical Measurements & Control, Dr. D. S. Kumar. Metropolitan Book Company
6. Fluid Mechanics and Hydraulic Machines, Mahesh Kumar, Pearson India
7. Engineering Thermodynamics- P.K Nag , McGraw Hill
8. Introduction to Robotics, S.K. Saha, McGraw Hill

JAS151: Physics Lab

List of Experiments

Any ten experiments (at least four from each group)

Group A

1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the specific rotation of cane sugar solution using polarimeter.
4. To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses.
5. To measure attenuation in an optical fiber.
6. To determine the wavelength of He-Ne laser light using single slit diffraction.
7. To study the polarization of light using He-Ne laser light.
8. To determine the wavelength of sodium light with the help of Fresnel's bi-prism.
9. To determine the coefficient of viscosity of a given liquid.
10. To determine the value of acceleration due to gravity (g) using compound pendulum.

Group B

1. To determine the energy band gap of a given semiconductor material.
2. To study Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
4. To verify Stefan's law by electric method.
5. To determine resistance per unit length and specific resistance of a given resistance using carry Foster's bridge.
6. To study the resonance condition of a series LCR circuit.
7. To determine the electrochemical equivalent (ECE) of copper.
8. To calibrate the given ammeter and voltmeter by potentiometer.
9. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
10. To measure high resistance by leakage method.

Reference Books:

1. Practical physics- K. K. Dey & B. N. Dutta (Kalyani publisher New Delhi).
2. Engineering physics- Theory and Practlcal- Katiyar & Pandey (Willey India).
3. Engineering physics practical- S K Gupta (Krishna Prakashan Meerut).

Course Outcomes:

1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of sodium light with the help of Fresnel's bi-prism.
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
4. To draw hysteresis (B –H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.

JAS-152/JAS-252 (Engineering Chemistry practical's)

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness in water sample using EDTA.
3. Determination of iron content in the given solution by Mohars method.
4. Determination of viscosity of given liquid.
5. Determination of surface tension of given liquid.
6. Determination of chloride content in water sample.
7. Determination of available chlorine in bleaching powder.
8. Determination of pH by pH metric titration.
9. Determination of rate constant by hydrolysis of esters.
10. Verification of Beers law.

JAS 104/ JAS 204 : ENVIRONMENT & ECOLOGY

Topics	Contact Hours
Unit-1	8
Environment: Definition, Types of Environment, Components of environment, Segments of environment, Scope and importance, Need for Public Awareness. **Ecosystem:** Definition, Types of ecosystem, Structure of ecosystem, Food Chain, Food Web, Ecological pyramid. Balance Ecosystem. Environmental Impact Assessment, Sustainable Development. **Biodiversity and its conservation**; Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity, consumptive use, India as a mega-diversity nation, Hot-sports of biodiversity. Threats to bio-diversity, habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	
Unit-2	8
Natural Resources: Introduction, Classification. **Water Resources;** Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and Arsenic Problems in Drinking Water. **Mineral Resources;** Material Cycles; Carbon, Nitrogen and Sulfur cycles. **Energy Resources;** Conventional and Nonconventional Sources of Energy. **Forest Resources;** Availability, Depletion of Forests, Environment impact of forest depletion on society.	
Unit-3	8
Pollution and their Effects; Public Health Aspects of Environmental; Water Pollution, Air Pollution, Soil Pollution, Noise Pollution, Solid waste management.	
Unit-4	8
Current Environmental Issues of Importance; Global Warming, Green House Effects, Climate Change, Acid Rain, Ozone Layer Formation and Depletion, Population Growth and Automobile pollution, Burning of paddy straw.	

Unit-5	8
Environmental Protection; Environmental Protection Act1986, Initiatives by Non Governmental Organizations (NGO's), **Human Population and the Environment:** Population growth, Environmental Education, Women Education.	

JAS105/JAS205: SOFT SKILLS

Course Objectives:

1. Students will be enabled to understand the correct usage of grammar.

2. Students will be able to converse well with effective speaking and listening skills in English

3. Students will be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading and writing

4. Student will be able to equip with basics of communication skills and will apply it for practical and oral purposes by being honed up in presentation skills and voice-dynamics

5. Students will be able build up personal traits that will make the transition from institution to workplace smoother and help them to excel in their jobs.

Content

Unit-1 Applied Grammar and Usage:
Transformation of Sentences Simple, Compound and Complex, Subject-verb agreement, Prefix and Suffix, Antonyms, Antonyms, Synonyms, Homophones, Homonyms, New word Formation, Select word power

Unit-2: Listening and Speaking Skills
Active Listening Meaning and Art of Listening. Traits of a Good Listener, listening modes, listening and Note taking. Types of Listening, Listening Techniques using Ted Talk Audio listening with script reading, Pronunciation; Speaking style content and sequencing.

Unit-3: Reading and Writing Skills:
Reading style: Skimming: Scanning, Churning & Assimilation, Effective writing tools and methods: Inductive Deductive; Exposition; Linear, Interrupted; Spatial & Chronological etc, Official and Business Letter writing, Agenda, Notices, Minutes of meeting,

Unit-4: Presentation and Interaction Skills
Introduction to oral communication, Nuances and Modes of Speech Delivery, Public speaking: confidence, clarity, and fluency, Individual Speaking: Elements; Nonverbal Communication: Kinesics, Paralinguistic features of Voice-Dynamics, Proxemics, Chronemics, and Presentation Strategies: planning, preparation, organization, delivery

Unit-5: Work-place skills:
Leadership qualities; Impact, Communication skills for Leaders: Listening and Responding: Mental health at work place: Managing Stress; Techniques: Application of 4 A's; Avoid; Alter, Access; Adapt

Course Outcomes:

1. Write professionally in simple and correct English.
2. Demonstrate active listening with comprehension, and the ability to write clear and well-structured emails and proposals.
3. Learn the use of correct body language and tone of voice to enhance communication
4. Acquire the skills necessary to communicate effectively and deliver presentations with clarity
and impact
5. Understand and apply some important aspects of core skills, like Leadership and stress management.

Prescribed Books:

1. Technical Communication, Second Ed.); O.U.P., Meenakshi Raman &5.Sharma New Delhi, 2011
2. Business Communication for Managers, PayalMehra, Pearson, Delhi, 2012.
3. Personality Development, Harold R. Wallace et al, Cengage Learning India Pvt. Ltd, New Delhi 2006
4. Practical Communication by LU.B. Pandey, ALT.B.S. Publications India Ltd., Krishan Nagar, Delhi 2013
5. Personality Development & Soft Skills, BarunK.Mitra, Oxford University Press, New Delhi, 2012.
6. Public Speaking, William S. Pfeiffer, Pearson, Delhi, 2012.
7. Human Values, A.N. Tripathi, New Age International Pvt. Ltd. Publishers New Delhi, 2005
8. English Grammar & Usage, R.P.Sinha, Oxford University Press, New Delhi, 2005.
9. English Grammar & Composition, Wren & Martin 5.Chand& Co Ltd, New Delhi, 2009.
10. Soft Skills for Everyone. Jeff Butterfield, Cengage Leaming India Pvt. Ltd, New Delhi 2017.

JEE151 / JEE251 : BASIC ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS

Note: A minimum of ten experiments from the following should be performed.

(A) Hardware based experiments

1. Verification of Kirchhoff's laws

2. Verification of Thevenin's & Norton's theorem

3. Verification of Superposition theorem

4. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor

5. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.

6. Connection and measurement of power consumption of a fluorescent lamp (tube light).

7. Measurement of power in 3- phase circuit by two-wattmeter method and determination of its power factor for star as well as delta connected load.

8. Determination of parameters of ac single phase series RLC circuit

9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase
   Transformer

10. Determination of efficiency of a dc shunt motor by load test

11. To study running and speed reversal of a three phase induction motor and record speed in both directions.

12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single-phase induction machine and synchronous machine.

13. Measurement of Energy by a single phase Energy Meter.

(B) Experiments available on virtual lab

1. Kirchhoff's laws.
   Virtual lab link: http://vlab.amrita.edu/?sub=3&brch=75&sim=217&cnt=2
2. Thevenin Theorem.
   Virtual lab link: https://vlab.amrita.edu/?sub=1&brch=75&sim=313&cnt=1
3. RLC series resonance.
   Virtual lab link: https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1
4. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
   Virtual lab link: http://vp-dei.vlabs.ac.in/Dreamweaver/measurement.html
5. Determination of parameters of ac single phase series RLC circuit.
   Virtual lab link: https://vlab.amrita.edu/?sub=1&brch=75&sim=332&cnt=1

6. To observe the B-H loop of a ferromagnetic material in CRO.
   Virtual lab link: https://vlab.amrita.edu/?sub=1&brch=282&sim=1507&cnt=2
7. Determination of the efficiency of a dc motor by loss summation method (Swinburne's test). Virtual lab link: http://em-iitr.vlabs.ac.in/exp5/index.php?section=Theory

Course Outcomes:

	Course Outcome (CO)	**Bloom's Level**
At the end of this course, the students should be able to:		
CO 1	Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits.	K_3
CO 2	Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.	K_4
CO 3	Perform experiment illustrating BH curve of magnetic materials.	K_3
CO 4	Calculate efficiency of a single phase transformer and DC machine.	K_4
CO 5	Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.	K_4

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

JEC151 / JEC251: BASIC ELECTRONICS ENGINEERING LAB

Suggestive List of Experiments

Part A:

1. Study of various types of Active & Passive Components based on the ir ratings.
2. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.
3. PCB Lab: a. Artwork & printing of a simple PCB. b. Etching & drilling of PCB
4. Winding shop: Step down transformer winding of less than 5VA.
5. Soldering shop: Soldering and disordering of Resistor in PCB. Soldering and disordering of IC in PCB. Soldering and disordering of Capacitor in PCB

Part B:

1. Study of Lab Equipment and Components: CRO, Multimeter, and Function Generator, Power supply-Active, Passive Components and Bread Board.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of V_{rms}, V_{dc}, and ripple factor.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance.
5. Characteristic of BJT: BJT in CE configuration.
6. To study Operational Amplifier as Adder and Subtractor
7. Verification of Truth Table of Various Logic Gate.
8. Implementation of the given Boolean function using logic gates in both SOP and POS forms.

Part (C):

Part A	**PCB Lab**: a. Artwork & printing of a simple PCB. b. Etching & drilling of PCB	This practical is not possible by virtual lab. It will be conducted only in physical mode
Part B	Study of Lab Equipment's and Components: CRO, Multi meter, Function Generator, Power supply- Active, Passive Components and Bread Board.	NA, These test equipment can be Demonstrated online from any lab of ECE department or physical mode is only option.

(D) Experiments available on virtual lab

PN Junction on diode: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.	http://vlabs.iitkgp.ernet.in/be/exp5/index.html
Applications of PN Junction diode: Half & Full wave rectifier- Measurement of V_{rms}, V_{dc}, and ripple factor.	http://vlabs.iitkgp.ernet.in/be/exp6/index.htmlhttp://vlabs.iitkgp.ernet.in/be/exp7/index.html
Characteristics of Zener diode: V-I characteristics of Zener diode, Graphical measurement of forward and reverse resistance.	http://vlabs.iitkgp.ernet.in/be/exp10/index.html
Characteristic of BJT: BJT in CE configuration.	http://vlabs.iitkgp.ernet.in/be/exp11/index.html
To study Operational Amplifier as Adder and Subtractor	http://vlabs.iitkgp.ernet.in/be/exp17/index.htmlhttp://vlabs.iitkgp.ernet.in/be/exp18/index.html
Verification of Truth Table of Various Logic Gate	https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/truth-table-gates/
Implementation of the given Boolean function using logic gates in both SOP and POS forms.	https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/realization-of-logic-functions/

Course Outcomes:
       1.Understand working of various logic gate.
       2. Understand working of PCB Soldring Techniques.
       3. Understand working of CRO.
       4.Understand working of multimeters.
       5. Understand working of function generator.

JCS151/JCS251: PROGRAMMING FOR PROBLEM SOLVING LAB
Contact Hours [0-0-3]

1. WAP that accepts them arks of 5 subjects and finds the sum and percentage marks obtained by the student.

2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.

3. WAP to calculate the area and circumference of a circle.

4. WAP that accepts the temperature in Centigrade and converts in to Fahrenheit using the formula C/5=(F-32)/9.

5. WAP that swaps values of two variables using a third variable.

6. WAP that checks whether the two numbers entered by the use rare equal or not.

7. WAP to find the greatest to the three numbers.

8. WAP that finds whether a given number is even or odd.

9. WAP that tells whether a given year is a leap year or not.

10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:

   Between 90-100% ----- Print 'A'
   80-90%-------------------- Print 'B'
   60-80% ------------------- Print 'C'
   Below 60%---------------Print 'D'

11. WAP that takes two operands and one operator from the user, perform the operation, and prints the result by using Switch statement.

12. WAP to print the sum of all numbers up to a given number.

13. WAP to find the factorial of a given number.

14. WAP to print sum of even and odd numbers from 1 to N numbers.

15. WAP to print the Fibonacci Series.

16. WAP to check whether the entered number is prime or not.

17. WAP to find the sum of digits of the entered number.

18. WAP to find the reverse of a number.

19. WAP to print Armstrong numbers from 1 to 100.

20. WAP to convert binary number in to decimal number and vice versa.

21. WAP that simply takes elements of the array from the user and finds the sum of these elements.

22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.

23. WAP to find the minimum and maximum element of the array.

24. WAP to search an element in a array using Linear Search.

25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.

26. WAP to add and multiply two matrices of order nxn.

27. WAP that finds the sum of diagonal elements of a mxn matrix.

28. WAP to implement strlen(), strcat(), strcpy() using the concept of Functions.

29. Define a structure data type TRAIN_INFO. The type contain Train No.: integer type Train name: string, Departure Time: aggregate type, TIME Arrival Time: aggregate type, TIME Start station: string, End station: string .The structure type Time contains two integer members: hour and minute. Maintain a train time table and implement the following operations:

   a. List all the trains (sorted according to train number) that depart from a particular section.

   b. List all the trains that depart from a particular station at a particular time.

   c. List all he trains that depart from a particular station within the next one hour of a given time.

   d. List all the trains between a pair of start station and end station.

30.   WAP to swap two elements using the concept of pointers.

31. WAP to compare the contents of two files and determine whether they are same or not.

32. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

Note:

a) *The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner*
b) *The subject teachers are suggested to use the concept of project based learning. The subject teacher may give r certain use cases/case studies where student is able to apply multiple concepts in one single program*
c) *It is also suggested that open source tools should be preferred to conduct the lab. Some open source online compiler to conduct the C lab are as follows:*

❖ **https://www.jdoodle.com/c-online-compiler/**
❖ **https://www.tutorialspoint.com/compile_c_online.php**
❖ **https://www.programiz.com/c-programming/online-compiler/**
❖ **https://www.hackerrank.com/**

Mapping with Virtual Lab

Name of the Lab	Name of the Experiment
ProblemSolvingLab	Numerical Representation
	Beauty of Numbers
	More on Numbers
	Factorials
	String Operations
	Recursion
	Advanced Arithmetic
	Searching and Sorting
	Permutation
	Sequences

Course Outcomes:

Course Outcome		Bloom's Level
At the end of course, the student will be able to:		
CO1	Able to implement the algorithms and draw flow charts for solving Mathematical and Engineering problems.	K_3,K_4
CO2	Demonstrate an understanding of computer programming language concepts.	K_3,K_2
CO3	Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.	K_6,K_4
CO4	Able to define data types and use them in simple data processing applications he/she must be able to use the concept of array of structures.	K_1,K_5
CO5	Develop confidence for self-education and ability for life-long learning needed for Computer language.	K_3,K_4

JAS 155 / JAS 255 English Language Lab

Course Objectives:

1. To facilitate software based learning to provide the required English Language proficiency to students.
2. To acquaint students with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking.
3. To train students to use the correct and error-free writing by being well versed in rules of English grammar.
4. To cultivate relevant technical style of communication and presentation at their work place and also for academic uses.
5. To enable students to apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics.

Professional Communication Lab shall have two parts:

1- Interactive Communication Skills:

Students should practice the language with variety of activities and exercises based on employability skills. Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication, based on International Phonetic Alphabets (L.P.A.)

LIST OF PRACTICALS

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns,
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistic/Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/proposals based on proper Stress and Intonation Mechanics
5. Official/Public Speaking practice sessions based on suitable Rhythmic Patterns.
6. Theme Presentation/ Keynote Presentation based on correct methodologies of argumentation
7. Individual Speech Delivery/Conferencing with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practical's on a model Audio
10. Startup presentations, Video portfolio, Extempore, Role play, Just a Minute (JAM) etc.

2- Computer assisted software based Language Learning:

Software based self-guided learning to provide the required English language proficiencyto students from an employability and career readiness standpoint. The software should align to

Common European Framework of Reference for Languages (CEFR) and deliver a CEFR level-B2 upon completion.

Course Outcome:

1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking.

2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.

3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing.

4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses.

5. Students will apply it for practical and oral presentation purposes by being haned up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.

Suggested Softwares:

Oxford Achiever by Oxford University Press.
Cambridge English Empower by Cambridge University Press.
MePro. by Pearson India Education Services Pvt. Ltd.
New Interactions by McGraw-Hill India.

Reference Books:

1. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors, 2009, Delhi.
2. Manual of Practical Communication by L.U.B. Pandey, A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi
3. Practical Communication Process & Practice, LU.B. Pandey: A.I.T.B.S. Pub. India Ltd Krishna Nagar, Delhi, 2013.
4. English Grammar and Usage by R.P. Sinha, Oxford University Press, 2005, New Delhi.
5. English Grammar, Composition and Usage by N.K.Agrawal&F.T.Wood, Macmillan India Ltd., New Delhi.
6. Effective Communication Skill, Kulbhushan Kumar, RS Salaria, Khanna Publishing House
7. English Grammar & Composition by Wren & Martin, S. Chand & Co. Ltd., New Delhi.
8. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd, 2011, New Delhi.

9. Personality Development, Harold R. Wallace &L.Ann Masters, Cengage Learning, New Delhi

10. Personality Development & Soft Skills, BarunK.Mitra, Oxford University Press, 2012 New Delhi.

11. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tatal McGraw Hill & Co. Ltd., 2001, New Delhi.

12. Developing Communication Skills by Krishna Mohan, MeeraBannerji-Macmillan India Ltd. 1990, Delhi.

13. Spoken English- A manual of Speech and Phonetics by R.K.Bansal&J.B.Harrison, Orient Blackswan, 2013, New Delhi.

14. Business English by Ken Taylor, Orient Blackswan, 2011, New Delhi

Course Objectives
1. To prepare the students for the effective technical communication.
2. To provide them exposure of techniques, skills, and modern engineering tools necessary for engineering practice.
3. To prepare the students to design a system, component, or process to meet desired needs within realistic constraints around them in professional life.

Content	Contact Hours
Unit-1 Introduction to Engineering Drawing and Orthographic Projections	8
Principles of Engineering Graphics and their significance. Dimensioning, Lettering Scales: Plain, Diagonal and Engineering Scales. Orthographic Projection, Projection of Point, Projection of Lines: Projection of straight lines; Projection of lines inclined to one plane and both planes.	
Unit-2 Projection of Planes and Solids	8
Projection of polygonal surface and circular lamina located in first quadrant inclined to one or both reference planes. Classification of solids, Projection of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.	
Unit-3 Sections of Regular Solids and development of Surfaces	8
Sections of Solids: Right regular solids and Auxiliary views for the true shape of the sections such as Prism, Cylinder, Pyramid, and Cone. Development of surfaces for various regular solids such as Prism, Cylinder, Pyramid and Cone.	
Unit-4 Isometric Projection	8
Isometric Projection: Isometric scales, Isometric projections of simple and combination of solids Perspective Projection: Orthographic representation of perspective views — Plane figures and simple solids — Visual Ray Method. Conversion of pictorial view into orthographic Projection.	
Unit-5 Introduction to Computer Aided Design	8
Introduction to AutoCAD: Basic commands for 2D drawing: Line, Circle, Polyline, Rectangle, Hatch, Fillet, Chamfer, Trim, Extend, Offset, Dim style, etc. Transformation of Projections: Conversion of Isometric Views to Orthographic Views and Vice-Versa in AutoCAD. Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form.	

Course Outcome: After completion, of course students will be able to:
CO 1: Use scales and draw projections of objects.
CO 2: Explain views of solids and their sectional surfaces.
CO 3: Analyse and draw isometric projections of objects.
CO 4: Demonstrate orthographic representation of perspective views using modern tools.
CO 5: Apply AutoCAD software for creation of engineering drawing and models

Suggested Text/ Books and References:
1. Bhatt N.D., Panchal V.M. and Ingle P.R. (2014), Engineering Drawing, Charotar Publishing House.
2. Shah, M.B. and Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. and Agrawal C.M. (2012), Engineering Graphics, TMH Publication
4. Engineering Graphics and Design, A.P. Gautam and Pradeep Jain, Khanna Publishing House
5. Narayana, K.L. and P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
6. (Corresponding set of) CAD Software Theory and User Manuals.

JWS151/ JWS251: WORKSHOP PRACTICE LAB

Course Outcomes:

The students will be able to		Blooms Level
CO1	Use various engineering materials, tools, machines and measuring equipments .	K3
CO2	Perform machine operations in lathe and CNC machine.	K3
CO3	Perform manufacturing operations on components in fitting and carpentry shop .	K3
CO4	Perform operations in welding, moulding, casting and forging .	K3
CO5	Fabricate a job by 3D printing manufacturing technique	K3

S.No.	Content	Contact Hours
1	**Introduction to Mechanical workshop material, tools and machines**	6
	To study layout, safety measures and different engineering materials (mild steel, medium carbon steel, high carbon steel, high speed steel and cast iron etc) used in workshop. To study and use of different types of tools, equipment, devices & machines used in fitting, sheet metal and welding section. To determine the least count of Vernier calliper, vernier height gauge, micrometer (Screw gauge) and take different reading over given metallic pieces using these instruments.	
2	**Machine shop**	4
	Demonstration of working, construction and accessories for Lathe machine Perform operations on Lathe - Facing, Plane Turning , step turning, taper turning, threading, knurling and parting.	
3	**Fitting shop**	4
	1. Practice marking operations. 2. Preparation of U or V -Shape Male Female Work piece which contains: Filing, Sawing, Drilling, Grinding.	
4	**Carpentry Shop**	4
	Study of Carpentry Tools, Equipment and different joints Making of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Join	
5	**Welding Shop**	4
	Introduction to BI standards and reading of welding drawings. Practice of Making following operations: Butt Joint Lap Joint TIG Welding MIG Welding	
6	**Moulding, Casting Shop and Forging**	6

	Introduction to Patterns, pattern allowances, ingredients of moulding sand and melting furnaces Foundry tools and their purposes Demo of mould preparation and Aluminum casting. Forging operation and tools. Practice – Study and perform different operation of black smithy and moulding of Plastic		
7.	**CNC Shop**		4
	Study of main features and working parts of CNC machine and accessories that can be used. Perform different operations on metal components using any CNC machines		
8	**To prepare a product using 3D printing**		3
	Concepts of 3D printing and its industrial application		

Reference Books:

1. Workshop Practice, H S Bawa, McGraw Hill
2. Mechanical Workshop Practice, K C John, PHI
3. Workshop Practice Vol 1, and Vol 2, by Hazra Choudhary , Media promoters and Publications
4. CNC Fundamentals and Programming, By P. M. Agrawal, V. J. Patel, Charotar Publication.