J. S. University, Shikohabad

B. Tech

3rd Semester& 4thSemester

(Mechanical Engineering)

Scheme

&

Syllabus

[Effective from the session 2021-22]

STUDY AND EVALUATION SCHEME FOR
B.TECH. (MECHANICAL ENGINEERING)

SEMESTER -III

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	Cr.	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTAS-302	Maths-IV	3	1	0	4	50	100	150	3
2	BTAS-301	Technical Communation	2	1	0	3	50	100	150	3
3	BTME-301	Thermodynamics	3	1	0	4	50	100	150	3
4	BTME-302	Fluid Mechanics& Fluid Machines	3	1	0	4	50	100	150	3
5	BTME-303	Materials Engineering	3	0	0	3	50	100	150	3
6	BTNC-301	Computer System Security	2	0	0	0	25	50		2
PRACTICAL / PROJECT SUBJECTS										
7	BTME-351P	Fluid Mechanics Lab	0	0	2	1	25	25	50	3
8	BTME-352P	Material Testing Lab	0	0	2	1	25	25	50	3
9	BTNC-353P	Computer Aided Machine Drawing-I lab	0	0	2	1	25	25	50	3
10	BTME-354P	Mini Projector Internship Assessment*	0	0	2	1	50		50	3
		MOOCs(Essential for Hons.Degree)				**22**	Grand Total		**950**	

***The Mini Project or Summer Internship (4weeks) / NPTEL Course (4-week) conducted during summer break after VI semester and same will be assessed / evaluated in the Semester-VII.

STUDY AND EVALUATION SCHEME FOR

B.TECH. (MECHANICAL ENGINEERING)

SEMESTER -IV

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	Cr.	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTOE043	Energy Science & Engineering	3	1	0	4	50	100	150	3
2	BTVE401	Universal Human Values	3	0	0	3	50	100	150	3
3	BTME-401	Applied Thermodynamics	3	0	0	3	50	100	150	3
4	BTME-402	Engineering Mechanics	3	1	0	4	50	100	150	3
5	BTME-403	Manufacturing Processes	3	1	0	4	50	100	150	3
6	BTNC402	Python Programming	2	0	0	0	25	50		2
PRACTICAL / PROJECT SUBJECTS										
7	BTME-451P	Applied Thermodynamics Lab	0	0	2	1	25	25	50	3
8	BTME-452P	Manufacturing Processes Lab	0	0	2	1	25	25	50	3
9	BTME-453P	Computer Aided Machine Drawing-II Lab	0	0	2	1	25	25	50	3
						21	Grand Total		**900**	

*****The Mini Project or Summer Internship (4weeks) / NPTEL Course (4-week) conducted during summer break after VI semester and same will be assessed / evaluated in the Semester-VII.

SEMESTER-III

(BTAS-302) MATHEMATICS-IV

Objectives:

1. The idea of partial differentiation and types of partial differential equations
2. The idea of classification of second partial differential equations, wave, heat equation and transmission lines
3. The basic ideas of statistics including measures of central tendency, correlation, regression and their properties.
4. The idea s of probability and random variables and various discrete and continuous probability distributions and their properties.
5. The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties.

Subject Code: BTAS-302	MATHEMATICS-IV	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Remember the concept of partial differential equation and to solve partial differential equations		
CO-2	Analyze the concept of partial differential equations to evaluate the problems concerned with partial differential equations		
CO-3	Understand the concept of correlation, moments, skewness and kurtosis and curve fitting		
CO-4	Remember the concept of probability to evaluate probability distributions		
CO-5	Apply the concept of hypothesis testing and statistical quality control to create control charts		

Module I: Partial Differential Equations

Origin of Partial Differential Equations, Linear and Non Linear Partial Equations of first order, Lagrange's Equations, Charpit's method, Cauchy's method of Characteristics, Solution of Linear Partial Differential Equation of Higher order with constant coefficients, Equations reducible to linear partial differential equations with constant coefficients.

Module II: Applications of Partial Differential Equations:

Classification of linear partial differential equation of second order, Method of separation of variables, Solution of wave and heat conduction equation up to two dimension, Laplace equation in two dimensions, Equations of Transmission lines.

Module III: Statistical Techniques I:

Introduction: Measures of central tendency, Moments, Moment generating function (MGF) , Skewness, Kurtosis, Curve Fitting , Method of least squares, Fitting of straight lines, Fitting of second degree parabola, Exponential curves , Correlation and Rank correlation, Regression Analysis: Regression lines of y on x and x on y, regression coefficients, properties of regressions coefficients and non-linear regression.

Module IV: Statistical Techniques II:

Probability and Distribution: Introduction, Addition and multiplication law of probability, Conditional probability, Baye's theorem, Random variables (Discrete and

Continuous Random variable) Probability mass function and Probability density function, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poission and Normal distributions.

Module V: Statistical Techniques III:

Sampling, Testing of Hypothesis and Statistical Quality Control: Introduction , Sampling Theory (Small and Large) , Hypothesis, Null hypothesis, Alternative hypothesis, Testing a Hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, T-test, F-test and Chi-square test, One way Analysis of Variance (ANOVA).Statistical Quality Control (SQC) , Control Charts , Control Charts for variables ($\bar{X}$ and R Charts), Control Charts for Variables (p, np and C charts).

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
3. S. Ross: A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

Reference Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2.T.Veerarajan : Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi.
3. R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.
4. J.N. Kapur: Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.
5. D.N .Elhance,V. Elhance & B.M. Aggarwal: Fundamentals of Statistics; Kitab Mahal Distributers, New Delhi.

[BTAS301] Technical Communication

Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- Understand the importance of effective technical communication
- Create trust among people and develop employability's.
- To sensitize the students to the appropriate use of non-verbal communication

Subject Code: BTAS-301	Technical Communication	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Students will be enabled to understand the nature and objective of Technical Communication relevant for the work place as Engineers.		
CO-2	Students will utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions.		
CO-3	Students would imbibe inputs by presentation skills to enhance confidence in face of diverse audience.		
CO-4	Technical communication skills will create a vast know-how of the application of the learning to promote their technical competence.		
CO-5	It would enable them to evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics.		

Unit -1 Fundamentals of Technical Communication:
Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

Unit - II Forms of Technical Communication:
Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration, C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Unit - III Technical Presentation: Strategies & Techniques Presentation:
Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience
Participation: Quizzes & Interjections.

Unit - V Dimensions of Oral Communication & Voice Dynamics:
Code and Content; Stimulus & Response; Encoding process; Decoding process; Pronunciation Etiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow in Speaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes: Empathy; Considerateness; Leadership; Competence.

Reference Books

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.

2. Personality Development and Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.

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

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

5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014,Delhi.

THERMODYNAMICS

Objectives:

- To learn about work and heat interactions, and balance of energy between system and its surroundings.
- To learn about application of I law to various energy conversion devices.
- To evaluate the changes in properties of substances in various processes.
- Tounderstandthedifferencebetweenhighgradeandlow-gradeenergiesandIIlawlimitationson energy conversion.

Subject Code: BTME-301	**THERMODYNAMICS**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	After completing, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions.		
CO-2	Students can evaluate changes in thermodynamic properties of substances.		
CO-3	The students will be able to evaluate the performance of energy conversion devices.		
CO-4	The students will be able to differentiate between high grade and low-grade energies.		

UNIT I

Review of Fundamental Concepts and Definitions:

Introduction- Basic Concepts: System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic view points, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle Reversibility Quasi – static Process, Irreversible Process, Causes of Irreversibility Energy and its forms, Work and heat (sign convention), Gas laws, Ideal gas, Real gas, Law of corresponding states, Property of mixture of gases, electrical, magnetic ,gravitational, spring and shaft work.

Zeroth law of thermodynamics: Concept of Temperature and its' measurement, Temperature scales.

First law of thermodynamics:

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. Limitations of first law of thermodynamics, PMM-I. Steady flow systems and their analysis, Steady flow energy equation, Boilers, Condensers, Turbine, Throttling process, Pumps etc.

UNIT II

Second law of thermodynamics:

Thermal reservoirs, Energy conversion, Heat engines, Efficiency, Reversed heat engine, Heat pump, Refrigerator, Coefficient of Performance, Kelvin Planck and Clausius statement of second law of thermodynamics, Equivalence of the two statements. Reversible and irreversible processes, Carnot cycle and Carnot engine, Carnot theorem and it's corollaries, Thermodynamic Temperature Scale, PMM-II.

Entropy: Clausius inequality, Concept of Entropy, Entropy change of pure substance in different thermodynamic processes, Tds equation, Principle of entropy increase, T-S diagram, Statement of the third law of thermodynamics.

UNIT III

Availability and Irreversibility:

Available and unavailable energy, Availability and Irreversibility, Second law efficiency, Helmholtz& Gibb's function.

Thermodynamic relations:

Conditions for exact differentials. Maxwell relations, Clapeyron equation,Joule ThompsoncoefficientandInversioncurve.Coefficientofvolumeexpansion, Adiabatic and Isothermal compressibility.

UNIT IV

Properties of steam and Rankine cycle:

Pure substance, Property of Pure Substance (steam), Triple point, Critical point, Saturation states, Sub-cooled liquid state, Super heated vapour state, Phase transformation process of water, Graphical representation of pressure, volume and temperature, P-T,P-VandP-hdiagrams,T-SandH-Sdiagrams, use of property diagram, Steam-Tables & Moller chart, Dryness factor and it's measurement, processes involving steam in closed and open systems. Simple Rankine cycle.

Air-water vapour mixture and Psychrometry: Psychometric terms and their definitions, Psychometric chart, Different Psychometric processes and their representation on Psychometric chart.

UNIT V

Refrigeration Cycles:

Reversed Carnot Cycle for gas and vapour. Refrigeration capacity, unit of refrigeration .Air Refrigeration cycles; Reversed Brayton Cycle and Bell Coleman Cycle. Vapour compression refrigeration cycle; simple saturated cycle and actual vapour compression refrigeration cycle. Analysis of cycles, effect of superheating, sub-cooling and change in evaporator and condenser pressure on performance of vapour compression refrigeration cycle. Refrigerants; their classification and desirable properties. Vapour absorption refrigeration system.

Books and References:

1. Basic and Applied Thermodynamics by P K Nag, MCGRAW HILLINDIA.
2. Thermodynamics for Engineers by Kroos& Potter, Cengage Learning.
3. Thermodynamics by Shavit and Gutfinger, CRC Press.
4. Thermodynamics-An Engineering Approach by Cengel, MCGRAW HILLINDIA.
5. Basic Engineering Thermodynamics, Joel, Pearson.
6. Fundamentals of Engineering Thermodynamics by Rathakrishnan, PHI.
7. Engineering Thermodynamics by Dhar, Elsevier.
8. Engineering Thermodynamics by Onkar Singh, New Age International.

FLUIDMECHANICS AND FLUIDMACHINES

Objectives:

- To learn about the application of mass and momentum conservation laws for fluid flows.
- To understand the importance of dimensional analysis.
- To obtain the velocity and pressure variations in various types of simple flows.
- To analyze the flow in water pumps and turbines.
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Subject Code: BTME-302	**FLUIDMECHANICS AND FLUID MACHINES**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Upon completion of this course, students will be able to mathematically analyze simple flow situations.		
CO-2	Basic understand boundary theory and their practical application and problems.		
CO-3	They will be able to evaluate the performance of pumps and turbines.		
CO-4	After complete this course student able to design turbine blade and analysis.		

UNIT-I

Definition of fluid, Newton's law of viscosity, Units and dimensions-Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension, Incompressible flow, Bernoulli's equation and its applications - Pitot tube, orifice meter, venturi meter and bend meter, notches and weirs, momentum equation and its application to pipe bends.

UNIT-II

Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic,sonicandsupersonicflows,sub-critical, critical and supercritical flows, one, two-andthree-dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential. Buckingham's Pitheorem, importantdimensionlessnumbersandtheirsignificance.

UNIT-III

Equation of motion for laminar flow through pipes, turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks.

Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub layer, separation and its control, Drag and lift, drag on a sphere, a two-dimensional cylinder, and an aerofoil, Magnus effect.

UNIT-IV

Introduction to hydrodynamic thrust of jet on a fixed and moving surface, Classification of turbines,Impulseturbines,Constructionaldetails,Velocitytriangles,Powerandefficiencyc

alculations,GoverningofPeltonwheel.FrancisandKaplanturbines,Constructionaldetails, Velocitytriangles,PowerandefficiencyPrinciplesofsimilarity,Unitandspecificspeed,Performancecharacteristics,Selectionofwaterturbines.

UNIT-V

Classifications of centrifugal pumps, Vector diagram, Work done by impellor, Efficiencies of centrifugal pumps, Specific speed, Cavitation & separation, Performance characteristics. Reciprocating pump theory, Slip, Indicator diagram, Effect of acceleration, air vessels, Comparison of centrifugal and reciprocating pumps, Performance characteristics.

Books and References:

1. Introduction to fluid mechanics and Fluid machines by S. K Som, Gautam Biswas, S Chakraborty.
2. Fluid mechanics and machines by R. K Bansal.
3. F.M. White, Fluid Mechanics, 6thEd.,TataMcGraw-Hill, 2008.
4. Fluid Mechanics and Its Applications by V.K .Gupta et.al.
5. Fluid Mechanics by Yunus Cengel.
6. Batchelor, G. K. (1999). Introduction to fluid dynamics. New Delhi, India: Cambridge University Press.

MATERIALS ENGINEERING

Objectives:

- Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity and failure criteria.
- To provide a detailed interpretation of equilibrium phase diagrams.
- Learning about different phases and heat treatment methods to tailor the properties of Fe-C alloys.

Subject Code: BTME-303	**MATERIALS ENGINEERING**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Student will be able to identify crystal structures for various materials and understand the defects in such structures.		
CO-2	How to quantify mechanical integrity and failure in materials.		
CO-3	Understand how to tailor material properties of ferrous and non-ferrous alloys.		
CO-4	Understand of heat treatment and application.		

UNIT-I

Crystal Structure: Unit cells, Metallic crystal structures, Ceramics. Imperfection in solids: Point, line, interfacial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Mechanical Property measurement: Tensile, compression and torsion tests; Young's modulus, relations between true and engineering stress-strain curves, generalized Hooke's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; Hardness: Rockwell, Brinell and Vickers and their relation to strength.

UNIT-II

Static failure theories: Ductile and brittle failure mechanisms, Tresca, Von-mises, Maximum normal stress,Mohr-CoulombandModifiedMohr-Coulomb; Fracture mechanics: Introduction to Stress-intensity factor approach and Griffith criterion. Fatigue failure: High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Fracture with fatigue, Introduction to non-destructive testing (NDT).

UNIT-III

Alloys, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron Ironcarbide phase diagram and micro structural aspectsofledeburite,austenite,ferrite and cementite, cast iron.

UNIT-IV

Heat treatment of Steel: Annealing, tempering, normalizing and spheroidising, isothermal transformation diagrams for FeC 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, vacuum and plasma hardening.

UNIT-V

Alloying of steel, properties of stainless steel and tool steels, maraging steels- cast irons; grey, white, malleable andspheroidalcastirons-copperandcopperalloys;brass,bronzeandcupro-nickel;Aluminiumand Al-Cu – Mg alloys-Nickel based super alloys and Titanium alloys.

Books and References:

1. W. D. Callister, 2006, "Materials Science and Engineering-An Introduction", 6th Edition, Wiley India.
2. Kenneth G. Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of
India Private Limited, 4thIndian Reprint,2002.
3. V. Raghavan, "Material Science and Engineering', Prentice Hall of India Private Limited,1999.
4. Mechanics of materials by James M.Gere.
5. Introduction to engineering materials by B. K. Agarwal.
6. Physical metallurgy and advanced materials by R.E. Smallman.
7. Engineering mechanics of composite materials by Isaac M .Daniel.
8. U.C.Jindal,"EngineeringMaterialsandMetallurgy",Pearson,2011.

COMPUTER SYSTEM SECURITY

Objectives:

In this course, the students will learn the various system vulnerabilities and network based attacks that can be typically mounted on organization networks and systems. The different tools and techniques that are well practiced in this context shall also be discussed. The course will be very helpful for the students to garner their skills as future ethical hackers that is a need of the society.

Subject Code: BTNC-301	COMPUTER SYSTEM SECURITY	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Understand the basic concept of communication, types of communication and its barriers.		
CO-2	How to write technical writing with different methods.		
CO-3	Understanding and fundamental concept of business communication likes business proposal, reports and another thing.		
CO-4	To improve presentation and listening skills with different strategies.		
CO-5	How to improved value based text readings.		

UNIT I

Computer System Security Introduction: Introduction, What is computer security and what to l earn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase.

Hijacking & Defense: Control Hijacking ,More Control Hijacking attacks integer overflow ,More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking - Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced Control Hijacking attacks.

UNIT II

Confidentiality Policies: Confinement Principle ,Detour Unix user IDs process IDs and privileges , More on confinement techniques ,System call interposition ,Error 404 digital Hacking in India part 2 chase , VM based isolation ,Confinement principle ,Software fault isolation , Rootkits ,Intrusion Detection Systems

UNIT III

Secure architecture principles isolation and leas: Access Control Concepts, UNIX and windows access control summary, other issues in access control, Introduction to browser isolation.

Web security landscape : Web security definitions goals and threat models , HTTP content rendering .Browser isolation .Security interface , Cookies frames and frame busting, Major web server threats ,Cross site request forgery ,Cross site scripting ,Defenses and protections against XSS , Finding vulnerabilities ,Secure development.

UNIT IV

Basic cryptography: Public key cryptography ,RSA public key crypto ,Digital signature

Hash functions ,Public key distribution ,Real world protocols ,Basic terminologies ,Email security certificates ,Transport Layer security TLS ,IP security , DNS security.

UNIT V

Internet Infrastructure: Basic security problems, Routing security, DNS revisited, Summary of weaknesses of internet security, .Link layer connectivity and TCP IP connectivity, Packet filtering firewall, Intrusion detection

Text books:

1. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.

2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.

3. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.

4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press,

2001.

FLUID MECHANICS LAB

Objectives:

- Tounderstandtheprinciplesandperformancecharacteristicsofflowandthermal devices.
- To know about the measurement of the fluid properties.

Subject Code: BTME-351P	**FLUID MECHANICS LAB**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	The students who have undergone the course will be able to measure various properties of fluids.		
CO-2	Understand characterize the performance of fluid.		
CO-3	Understand the thermal machinery.		.

List of Experiments: (At least 8 of the following)

1. To determine the coefficient of impact for vanes.
2. To determine coefficient of discharge of an orifice meter.
3. To determine the coefficient of discharge of Notch (V and Rectangular types).
4. To determine the friction factor for the pipes.
5. To determine the coefficient of discharge of venturi meter.
6. To determine the coefficient of discharge, contraction & velocity of an orifice.
7. To verify the Bernoulli's Theorem.
8. To find critical Reynolds number for a pipe flow.
9. To determine the meta-centric height of a floating body.
10. To determine the minor losses due to sudden enlargement, sudden contraction and bends.
11. To show the velocity and pressure variation with radius in a forced vertex flow.

MATERIALTESTING LAB

Objectives:

- To understand the principles and performance characteristics different materials.
- To know about material properties.

Subject Code:BTME-352P	**MATERIALTESTING LAB**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	The students who have under gone the course will be able to measure various properties of materials.		
CO-2	Understand the material testing, sample preparation for different testing.		
CO-3	Understand the non-destructive testing.		.

List of Experiments :(At least8 of the following)

1. Strength test of a given mild steel specimen on UTM with full details and stress versus strain plot on the machine.
2. Other tests such as shear bend tests on UTM.
3. Impact test on impact testing machine like Charpy, Izod or both.
4. Hardness test of given specimen using Rockwell and Vickers/Brinell testing machines.
5. Spring index test on spring testing machine.
6. Fatigue test on fatigue testing machine.
7. Creep test on creep testing machine.
8. Experiment on deflection of beam, comparison of actual measurement of deflection with dial gauge to the calculated one, and or evaluation of young's modulus of beam.
9. Torsion test of a rod using torsion testing machine.
10. Study of NDT (non-destructive testing) methods like magnetic flaw detector, ultrasonic flaw detector, eddy current testing machine, dye penetrant tests.

COMPUTERAIDED MACHINEDRAWING-ILAB

L-T-P
0-0-2

Objectives:
To provide an overview of how computers can be utilized in mechanical component design.

Subject Code: BTME-353P	**COMPUTERAIDED MACHINEDRAWING-ILAB**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Upon completion of this course, the students can use computer and CAD software for modelling mechanical components.		
CO-2	Outcome of this lab to understand joint theory and their design concepts.		
CO-3	Basic understand the software.		.

UNIT-I
Introduction (1drawingsheets)
Introduction, classification of machine drawings, principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, lines and rules of dimensioning.
Orthographic Projections (3 drawing sheets)
Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing line problems, principle of visualization of objects, sectional views, full and half sectional views, auxiliary views.

UNIT-II
Fasteners (2 drawing sheets)
Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints.

UNIT-III
Riveted joints (1 drawing sheet)
Introduction, rivets and riveting ,types of rivets, types of riveted joints, drawing of boiler joints etc.
Freeh and sketching (1 drawing sheet**)**
Introduction ,Need for free hand sketching, Free hand sketching of foundation bolts, studs, pulleys, couplings etc.

UNIT-IV
Assembly drawing (2drawing sheets)
Introduction to assembly drawing, drawing assembly drawing of simple machine elements like rigid or flexible coupling, muff coupling, Plummer block, footstep bearing, bracket etc.

UNIT-V
Computer aided drafting (1drawing**)**
Introduction to computer aided drafting; advantages and applications of CAD, concepts of computer aided 2D drafting using any drafting software like AutoCAD, Solid Edge, Draft Sight etc., basic draw and modify commands, making 2D drawings of simple machine parts.

Books and References:

1. Fundamentals of Machine Drawing by Sadhu Singh &Shah, PHI.
2. Engineering Drawing by Bhat, & Panchal, Charotar Publishing House.
3. Machine Drawing with AutoCAD by Pohit and Ghosh, Pearson.
4. Machine Drawing-K L Narayana, P Kannaiah, K V Reddy, NewAge.
5. Machine Drawing, N. Siddeshswar ,P Kannaiah, V V S Shastry, Tata Mc Graw Hill.
6. Engineering Drawing, Pathak, Wiley.
7. Textbook of Machine Drawing, K C John, PHI.
8. AutoCAD2014for Engineers &Designers, Bhatt, WILEY

SEMESTER-IV
Energy Science and Engineering

Course Outcome's

SubjectCode:BTAS-401	Energy Science and Engineering	LTP: 310	Credits:3
The students will be able to			**Blooms Taxonomy**
CO-1	Learn about the Indian and World Energy Scenario and world energy use resources, Energy cycle on earth etc.		
CO-2	Understand the types of energy, energy storage and energy conversion systems.		
CO-3	Learn the energy economy final energy consumption energy needs of growing economy		
CO-4	Know about Energy conservation act its features and related policies other acts. The Integrated energy policy2006 etc.		
CO-5	Learn about the energy and environment, air pollution climate changes and its Impacts on sustainable development		

Unit-I

Energy and its Usage: Units and scales of energy use, Mechanical energy and transport, Heat energy: Conversion between heat and mechanical energy, Electromagnetic energy: Storage, conversion, transmission and radiation, Introduction to the quantum, energy quantization, Energy in chemical systems and processes, flow of CO_2, Entropy and temperature, carnot and Stirling heat engines, Phase change energy conversion, refrigeration and heat pumps, Internal combustion engines, Steam and gas power cycles, the physics of power plants. Solid-state phenomena including photo, thermal and electrical aspects

Unit-II

Nuclear Energy: Fundamental forces in the universe, Quantum mechanics relevant for nuclear physics, Nuclear forces, energy scales and structure, Nuclear binding energy systematics, reactions and decays, Nuclear fusion, Nuclear fission and fission reactor physics, Nuclear fission reactor design, safety, operation and fuel cycles

Unit-III

Solar Energy: Introduction to solar energy, fundamentals of solar radiation and its measurement aspects, Basic physics of semiconductors, Carrier transport, generation and recombination in semiconductors, Semiconductor junctions: metal-semiconductor junction & p-n junction, Essential characteristics of solar photovoltaic devices, First Generation Solar Cells, Second Generation Solar Cells, Third Generation Solar Cells

Unit-IV

Conventional & non-conventional energy source: Biological energy sources and fossil fuels, Fluid dynamics and power in the wind, available resources, fluids, viscosity, types of fluid flow, lift, Wind turbine dynamics and design, wind farms, Geothermal power and ocean thermal energy conversion, Tidal/wave/hydro power

Unit-V

Systems and Synthesis: Overview of World Energy Scenario, Nuclear radiation, fuel cycles, waste and proliferation, Climate change, Energy storage, Energy conservation. Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts, LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption

Reference/Text Books

1. Energy and the Challenge of Sustainability, World Energy Assessment, UNDP, New York, (2000).
2. Perspective of Modern Physics, A. Beiser, McGraw-Hill International Editions (1968).
3. Introduction to Modern Physics, H.S. Mani and G.K.Mehta, East-West Press (1988).
4. Introduction to Electrodynamics, D. J. Griffiths, Fourth Edition, Prentice Hall (2013).
5. Introductory Nuclear Physics, R. K. Puri and V.K. Babbar, Narosa Publishing House (1996).

Universal Human Values and Professional Ethics

Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Subject Code:BTAC-401	**Universal Human Values**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society		
CO-2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.		
CO-3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society		
CO-4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.		
CO-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.		

UNIT-1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-2

Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I',Under standing the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

UNIT-3

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction ,Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!.

UNIT-4

Understanding Harmony in the Nature and Existence – Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

UNIT-5

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

APPLIEDTHERMODYNAMICS

Objectives:

- To learn about of I law for reacting systems and heating value of fuels.
- To learn about gas and vapor cycles and their first law and second law efficiencies.
- To understand about the properties of dry and wet air and the principles of psychrometry.
- To learn about gas dynamics of airflow and steam through nozzles.
- Tolearntheaboutreciprocatingcompressorswithandwithoutintercooling.
- To analyze the performance of steam turbines.

Subject Code: BTME-401	**APPLIEDTHERMODYNAMICS**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	Aftercompletingthiscourse,thestudentswillgetagoodunderstandingofvariouspracticalpowercycles and heat pump cycles		
CO-2	Theywillbeabletoanalyzeenergyconversioninvariousthermaldevicessuchascombustors, aircoolers, nozzles, diffusers, steam turbines and reciprocating compressors.		
CO-3	They will be able to understand phenomena occurring in high speed compressible flows		.

UNIT I

Introduction to solid, liquid and gaseous fuels– Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions-Heat calculations using enthalpy tables-Adiabatic flame temperature-Chemical equilibrium and equilibrium composition calculations using free energy.
Introduction and Otto, Diesel and Dual cycles.

UNIT II

Vapour Power cycles:
Vapor power cycles Rankine cycle with superheat, reheat and regeneration, exergy analysis. Rankine cycle, effect of pressure and temperature on Rankine cycle, Reheat cycle, Regenerative cycle, Feed water heaters, Binary vapour cycle, Combined cycles, Cogeneration.
Fuels and Combustion: Combustion analysis, heating values, air requirement, Air/Fuel ratio, standard heat of reaction and effect of temperature on standard heat of reaction, heat of formation, Adiabatic flame temperature.

UNIT III

Boilers: Classifications and working of boilers, boiler mountings and accessories, Draught and its calculations, air pre-heater, feed water heater, super heater. Boiler efficiency, Equivalent evaporation. Boiler trial and heat balance.
Condenser: Classification of condenser, air leakage, condenser performance parameters.

UNIT IV

Steam and Gas Nozzles: Flow through Convergent and convergent-divergent nozzles, variation ofvelocity,areaandspecificvolume,chokedflow,throatarea,Nozzleefficiency,Offdesignoperationof nozzle, Shock waves stationary normal shock waves, Effect of friction on nozzle, Super saturated flow.
Steam Turbines: Classification of steam turbine, Impulse and Reaction turbines, Staging, Stage and Overall efficiency, reheat factor, Bleeding, Velocity diagram of simple and compound multistage impulse and reaction turbines and related calculations, work done, efficiencies of reaction, Impulse reaction turbines, state point locus, Losses in steam turbines, Governing of turbines, Comparison with steam engine.

UNIT V

Gas Turbine: Gas turbine classification, Brayton cycle, Principles of gas turbine, Gas turbine cycles with inter cooling, reheat and regeneration and their combinations, Stage efficiency, Polytropic efficiency. Deviation of actual cycles from ideal cycles.
Jet Propulsion: Introduction to the principles of jet propulsion, Turbojet and turbo prop engines and their processes, Principle of rocket propulsion, Introduction to Rocket Engine. Reciprocating compressors, staging of reciprocating compressors, optimal stage pressure ratio, effect of intercooling, minimum work for multi stage reciprocating compressors.

Books and References:

1. Basic and Applied Thermodynamics by P.K. Nag, mc graw hill india.
2. Applied thermodynamics by Onkar Singh, New Age International.
3. AppliedThermodynamicsforEngineeringTechnologistsbyEastop,PearsonEducation.
4. Applied Thermodynamics by Venkanna And Swati, PHI.
5. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals ofThermodynamics, John Wileyand Sons.
6. Jones,J.B. and Duggan, R.E., 1996,EngineeringThermodynamics,Prentice-Hall of India
7. Moran,M.J. and Shapiro,H. N.,1999,Fundamentals of Engineering Thermodynamics, John Wileyand Sons.
8. Theory of Stream Turbine by W J Kearton.

ENGINEERING MECHANICS

Objectives:

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

Subject Code: BTME-402	**ENGINEERING MECHANICS**	**L T P : 3 1 0**	**Credits: 3**
The students will be able to			**Blooms Taxonomy**
CO-1	After completing this course, the students should be able to understand the various effect of force and motion on the engineering design structures.		
CO-2			
CO-3			.

UNIT-I:

Two-dimensional force systems: Basic concepts, Laws of motion, Principle of transmissibility of forces, transfer of a force to parallel position, resultant of a force system, simplest resultant of two dimensional concurrent and non-concurrent force systems, distribution of force systems, free body diagrams, equilibrium and equations of equilibrium.

Friction: Friction force–Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction.

UNIT-II:

Beam: Introduction, shear force and bending moment, different equations of equilibrium, shear force and bending moment diagram for statically determined beams.

Trusses: Introduction, simple truss and solution of simple truss, methods of F-joint and methods of sections.

UNIT-III:

Centroid and moment of inertia: Centroid of plane, curve, area, volume and composite bodies, moment of inertia of plane area, parallel axis theorem, perpendicular axis theorem, principle moment of inertia, mass moment of inertia of circular ring, disc, cylinder, sphere, and cone about their axis of symmetry.

UNIT-IV:

Kinematics of rigid body: Introduction, plane motion of rigid body, velocity and acceleration under translational and rotational motion, relative velocity.

Kinetics of rigid body: Introduction, force, mass and acceleration, work and energy, impulse and momentum, D'Alembert's principle and dynamic equilibrium.

UNIT-V:

Simple stress and strain: Introduction, normal and shear stresses, stress-strain diagrams for ductile and brittle material, elastic constants, one-dimensional loading of members of varying cross sections, strain energy.

Pure bending of beams: Introduction, simple bending theory, stress in beams of different cross sections.

Torsion: Introduction, torsion of shafts of circular cross sections, torque and twist, shear stress due to torque.

Books and References:

1. Beer,F.PandJohnstonJr.E.R.,"VectorMechanicsforEngineers(InSIUnits):StaticsandDynamics",8thEdition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali ,"Engineering Mechanics", Oxford University Press(2010).
3. A Text book of Engineering Mechanics, R.K. Bansal, Laxmi Publications.
4. Engineering Mechanics, R.S. Khurmi, S. Chand Publishing.
5. MeriamJ.L.andKraigeL.G.,"EngineeringMechanics-Statics-Volume1,Dynamics-Volume2",Third Edition, John Wiley& Sons (1993).
6. RajasekaranSandSankarasubramanianG.,"EngineeringMechanicsStaticsandDynamics",3rdEdition,Vikas Publishing House Pvt. Ltd., (2005).
7. Bhavikatti,S.SandRajashekarappa,K.G.,"EngineeringMechanics",NewAgeInternational(P)LimitedPublishers, (1998).
8. Engineering mechanics byIrving H.Shames, Prentice-Hall.

MANUFACTURING PROCESSES

Course Outcome's

Subject Code: BTME-403	MANUFACTURING PROCESSES	LTP: 310	Credits: 3
The students will be able to			**Blooms Taxonomy**
CO-1	Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products.		
CO-2	Understand the fundamentals of manufacturing processes.		
CO-3	Understand the metal cutting process with tool geometry		.
CO-4	Understand the grinding and super finishing.		
CO-5	To understand the different conventional and unconventional manufacturing methods		

UNIT-I

Conventional Manufacturing processes:

Casting and moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage, riser design, casting defects and residual stresses. Introduction to bulk and sheet metal forming, plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk forming (forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending) principles of powder metallurgy.

UNIT-II

Metal cutting: Single and multi-point cutting; Orthogonal cutting, various force components: Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, cutting tool materials,cuttingfluids,Coating;Turning,Drilling,Millingandfinishingprocesses,IntroductiontoCNCmachining.Additive manufacturing: Rapid prototyping and rapid tooling Joining/fastening processes: Physics of welding, brazing and soldering; design considerations in welding, Solid and liquid state joining processes; Adhesive bonding.

UNIT-III

Grinding &Super finishing:

Grinding: Grinding wheels, abrasive & bonds, cutting action. Grinding wheel specification. Grinding wheel wear-attritions wear, fracture wear. Dressing and Truing. Max chip thickness and Guest criteria. Surface and cylindrical grinding. Centre less grinding.

Super finishing: Honing, lapping and polishing.

UNIT-IV

Metal Joining (Welding):

Survey of welding and allied processes. Gas welding and cutting, process and equipment. Arc welding: Power sources and consumables. TIG & MIG processes and their parameters. Resistance welding spot, seam projection etc. Other welding processes such as atomic hydrogen, submerged arc, electro slag, friction welding. Soldering& Brazing. Adhesive bonding. Weld decay in HAZ.

UNIT-V

Unconventional Machining Processes:

Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, UltrasonicMachining,principlesandprocessparameters.ElectricalDischargeMachining,principleandprocessesparameters, MRR, surface finish ,tool wear, dielectric, power and control circuits, wire EDM; Electro-chemical machining(ECM), etchant &maskant, process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining.

Course Outcomes:

Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products.

Books and References:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)-PearsonIndia, 2014.
2. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, andSystems.
3. Manufacturing Technology by P.N. Rao., MCGRAWHILLINDIA.
4. Materials and Manufacturing by Pau lDegarmo.
5. Manufacturing Processes by Kaushish, PHI.
6. Principles of Foundry Technology, Jain,MCGRAW HILL INDIA
7. Production Technology by RK Jain.
8. Degarmo, Black &Kohser, Materials and Processes in Manufacturing.

APPLIEDTHERMODYNAMICSLAB

L-T-P
0-0-2

Objectives:
To understand the principles and performance of various boilers and engines.

SubjectCode:BTME-451P	APPLIEDTHERMODYNAMICSLAB	LTP: 310	Credits:3
The students will be able to			**Bloo msTaxo nomy**
CO-1	The student who have under gone the course will be able to identify various properties of system..		
CO-2	Perform experiments to measure thermodynamic properties of fluids and solids.		
CO-3	Analyze and interpret experimental data using thermodynamic principles and equations of state.		.
CO-4	Students will be able to understand the steam engines.		
CO-5	Students will be able to analyse the gas turbine.		

List of Experiments :(At least8 of the following)

1. Study of Fire Tube boiler.
2. Study of Water Tube boiler.
3. Study and working of Two stroke petrol Engine.
4. Study and working of Four stroke petrol Engine.
5. Determination of Indicated H.P. of I.C. Engine by Morse Test.
6. Prepare the heat balance sheet for Diesel Engine test rig.
7. Prepare the heat balance sheet for Petrol Engine test rig.
8. Study and working of two stroke Diesel Engine.
9. Study and working of four stroke Diesel Engine.
10. Study of Velocity compounded steam turbine.
11. Study of Pressure compounded steam turbine.
12. Study of Impulse &Reaction turbine.
13. Study of steam Engine model.
14. Study of Gas Turbine Model.

MANUFACTURING PROCESS LAB

L-T-P
0-0-2

Objectives:

To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials in to the desirable product by conventional or unconventional manufacturing methods.

SubjectCode:BTME-453P	MANUFACTURINGPROCESS LAB	LTP: 310	Credits:3
The students will be able to			**Bloo msTaxo nomy**
CO-1	Upon completion of this course, students will be able to understand the different conventional and Unconventional manufacturing methods employed for making different products.		
CO-2	Apply various manufacturing processes to produce different types of components and products.		
CO-3	Interpret engineering drawings and select appropriate manufacturing methods for a given part.		.
CO-4	The students will be able to know the design and drawing of Jigs & Fixture to hold the job on different machines.		
CO-5	The students will be able to know the different types of welding processes and also the latest welding (joining) process like TIG &MIG		

List of Experiments: (At least8ofthe following along-with study of the machines/processes)

1. Shear-angle determination (using formula) with tube cutting (for orthogonal) on lathe machine.
2. Bolt(thread) making on Lathe machine.
3. Tool grinding (to provide tool angles) on tool-grinder machine.
4. Gear cutting on Milling machine.
5. Machining a block on shaper machine.
6. Finishing of a surface on surface-grinding machine.
7. Drilling holes on drilling machine and study of twist-drill.
8. Study of different types of tools and its angles & materials.
9. Experiment on tool wear and tool life.
10. Experiment on jigs/Fixtures and its uses.
11. Gas welding experiment.
12. Arc welding experiment.
13. Resistance welding experiment.
14. Soldering & Brazing experiment.
15. Study and understand ing of limits, fits & tolerances.
16. Study of temperature measuring equipment’s.
17. Measurement using Strain gauge.
18. Experiment on dynamometers.
19. To study the displacement using LVDT.

COMPUTERAIDED MACHINEDRAWING-II LAB

Objectives:

To provide an overview of how computers can be utilized in mechanical component design.

SubjectCode:BTME-454P	COMPUTERAIDEDMACHINEDRAWING-IILAB	LTP: 310	Credits:3
The students will be able to			**BloomsTaxonomy**
CO-1	Upon completion of this course, the students can use computer and CAD software for modelling mechanical components.		
CO-2	Create 2D and 3D models of mechanical parts and assemblies using computer-aided design (CAD) software.		
CO-3	Evaluate and optimize designs for manufacturability, functionality, and cost using computer simulations and Analysis tools.		.
CO-4	The students will be able to understand design and drawing of Production Drawing system.		
CO5	The students will be able to work on various Computer Aided Drafting software like Auto CAD, ProE etc		

Note: All drawing conforms to BIS Codes.

Introduction: Conventional representation of machine components and materials, Conventional representation of surface finish, Roughness number symbol, Symbols of Machine elements and welded joints. Classification of Drawings: Machine drawings, Production drawing, part drawing and assembly drawing. Introduction to detail drawing and bill of materials (BOM).

Limits, Fits and Tolerances: General aspects, Nominal size and basic dimensions, Definitions, Basis of fit or limit system, Systems of specifying tolerances, Designation of holes, Shafts and fits, Commonly used holes and shafts. List of Standard Abbreviation used.

Part Modelling: Introduction to part modelling of simple machine components using any 3D software(like CATIA, PRO E, UGNX, Autodesk Inventor or SOLIDWORKS) covering all commands/ features to develop a part model ***(Minimum 24machine components need to be developed).***

Part Modelling & Assemblies of: Plummer Block Bearing, Machine Vice, Screw Jack, Engine Stuffing box, Lathe Tail stock, Feed Check Valve and Rams Bottom Safety Valve.

Books and References:

1. Text book of Machine Drawing, KC John, PHI.
2. Machine Drawing by K.R. Gopala krishna, Subhas Stores.
3. A Textbook of Machine Drawing by P S GillfromS.K. Kataria& Sons.
4. Machine Drawing-KL Narayana, P Kannaiah ,KV Reddy, New Age publications.
5. Engineering Graphics with Auto CAD, Bethune, PHI.
6. Machine Drawing ,N. Siddeshswar, P Kannaiah,VVS Shastry, Tata Mc Graw Hill.
7. Fundamentals of Machine Drawing,Dr Sadhu Singh &P L Shah, Prantice Hall India.
8. Auto desk Inventor by Examples, Sam Tikoo ,Wiley.