MULTIDISCIPLINARY COURSES OF MECHANICAL ENGINEERING OFFERED TO OTHER DEPARTMENT (Path A)									
Category	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
MDM	BTME25MD304A	Basic Thermodynamics	3	0	0	20	20	60	100	3
MDM	BTME25MD404A	Manufacturing Technique	3	0	0	20	20	60	100	3
MDM	BTME25MD505A	Fluid Mechanics	3	0	0	20	20	60	100	3
MDM	BTME25MD509L	Fluid Mechanics Lab	0	0	2	50	0	50	100	1
MDM	BTME25MD606A	Theory of Machines	2	0	0	20	20	60	100	2
MDM	BTME25MD705A	Machine Design	2	0	0	20	20	60	100	2

Subject Code BTME25MD304A	Basic Thermodynamics	Teaching Scheme 03L - 00T - 00P	Credits 03

Teaching Scheme	Examination Scheme
Theory: 3 hr./week Tutorial : Practical:	Continuous Assessment: 20 Marks Mid-Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course objective:

1	Introduce fundamental thermodynamic concepts such as systems, properties, processes, and equilibrium to build a strong conceptual foundation.
2	Explain the principles of energy interactions through work and heat transfer, including measurement techniques and thermodynamic laws.
3	Apply the First Law of Thermodynamics to closed and open systems, analyzing energy balances in engineering devices like turbines and compressors.
4	Explore the Second Law of Thermodynamics to understand entropy, irreversibility, and the limitations of energy conversion processes.
5	Familiarize students with ideal gases and pure substances, including phase changes, property diagrams, and steam tables for practical applications.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Define and classify thermodynamic systems and processes, and distinguish between macroscopic and microscopic viewpoints.
CO2	Analyze energy interactions using the First Law of Thermodynamics in both closed and steady-flow systems.
CO3	Evaluate the performance of thermodynamic cycles and explain the implications of the Second Law, including entropy and reversibility.
CO4	Solve problems involving ideal gases using various equations of state and thermodynamic relations.
CO5	Interpret phase diagrams and steam tables to determine the properties of pure substances and analyze phase change processes.

Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	2	1	1	1	1	1	1
CO2	3	3	2	1	2	1	1	1	1	1	1
CO3	3	3	2	1	2	1	1	1	1	1	1
CO4	3	3	2	1	2	1	1	1	1	1	1
CO5	3	3	2	1	2	1	1	1	1	1	1

Course Contents:

Unit 1 **(09 Hours)**

Fundamental Concepts and Definitions

Thermodynamic system and its type; Macroscopic vs. Microscopic viewpoint, properties, processes and cycles, point function, path function. Thermodynamic equilibrium, Quasi-static process. Work and heat Transfer: Work transferred and other types of work, Heat transfer, temperature and its measurement (principle of measurement, various instruments etc.). Zeroth law of thermodynamics, specific heat and latent heat, relationship between C_P and C_V.

Unit 2 **(09 Hours).**

First Law of Thermodynamics

First law of thermodynamics for a closed system undergoing a cycle and change of state, Energy, different forms of energy, Enthalpy, PMM-I control volume. Application of first law of steady flow processes (nozzle, turbine, compressor, pump, boiler, throttle valve etc.)

Unit 3 **(09 Hours)**

Second Law of Thermodynamics

Limitation of first law of thermodynamics, cycle heat engine, refrigerator and heat pump, Kelvin-Plank and Clausius statements and their equivalence, Reversibility and Irreversibility, Carnot cycle, Carnot theorem, Absolute thermodynamic temperature scale.

Entropy: Introduction, Clausius theorem, T-s plot, Clausius inequality, Entropy and Irreversibility, Entropy principle and its application, combined I and II law, Entropy and direction, Entropy and disorder

Unit 4 **(09 Hours)**

Ideal gas

Boyle‟s law, Charl‟s law, Avogadro‟s law, universal gas constant, ideal processes with question, other equations of states.

Unit 5 **(09 Hours)**

Properties of Pure Substance

Phase change phenomenon of pure substance, phase diagram of pure substance, p-v, T-s, and h-s diagrams properties of steam, critical point parameters, triple point, property table, representation of processes of steam on p-v, T-s, and other diagrams, Dryness fraction and its measurement.

Texts/Reference Books:

1. P. K. Nag, “Engineering Thermodynamics”, Tata McGraw Hill, New Delhi, 3rd edition, 2005.
2. Y. A. Cengel, M. A. Boles, “Thermodynamics - An Engineering Approach”, Tata McGraw Hill, 5thedition, 2006.
3. R K Rajput, A Textbook of Engineering Thermodynamics, Laxmi Publication, 5th Edition, 2016.
4. Domkunwar, A Course in Thermal Engineering, Dhanpat Rai & Co., 6th edition, 2016.
5. Y.V.C.Rao, An Introduction to Thermodynamics, Universities Press, 2004.
6. C. P. Arora,Thermodynamics, Tata McGraw-Hill Publishing Company Ltd,2005.
7. David R. Gaskell, Introduction to Thermodynamics of Materials, Taylor and Francis Publisher, 2003.
8. M. Achuthan, Engineering Thermodynamics, Prentice Hall India Limited, 2004.
9. G. J. Van Wylen, R. E. Sonntag, “Fundamental of Thermodynamics”, John Wiley and Sons, 5thedition, 1998.
10. J. Moran, H. N. Shapiro, “Fundamentals of Engineering Thermodynamics”, John Wiley and Sons, 4th edition, 2004.
11. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edit ion, Fundamentals of Thermodynamics,
    John Wiley and Sons.
12. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India.
13. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
14. Yunus A. Cengel, (2005), Thermodynamics: An Engineering Approach, Tata McGraw- Hill Publishing Company Ltd.

Subject Code	Manufacturing Technique	Teaching Scheme	Credits
BTME25MD404A		03L - 00T - 00P	03

Teaching Scheme	Examination Scheme
Theory : 3 hr./week	Continuous Assessment: 20 Marks
Tutorial :	Mid-Semester Exam: 20 Marks
Practical:	End Semester Exam: 60 Marks/ Internal Assessment:

Course objective:

1.	To understand various manufacturing processes
2.	To make students aware of various casting and metal forming processes as per the application
3.	To teach principles of advanced welding processes and their applications
4.	To understand the fundamentals of metal cutting and the parameters of cutting forces
5.	To acquire skills to produce a composite job by manual process.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Identify castings processes, working principles and applications and list various defects in metal casting
CO2	Develop Understand the various metal forming processes, working principles and applications
CO3	Classify the basic joining processes and demonstrate principles of welding, brazing and soldering.
CO4	Study center lathe and its operations including plain, taper turning, work holding devices and cutting tool.
CO5	Understand drilling their types, reaming, milling machines and operations.

Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	2	1	1	1	1	1	1
CO2	3	3	2	1	2	1	1	1	1	1	1
CO3	3	3	2	1	2	1	1	1	1	1	1
CO4	3	3	2	1	2	1	1	1	1	1	1
CO5	3	3	2	1	2	1	1	1	1	1	1

Course Contents:

Unit 1 **(09 Hours)**

Introduction and Casting Processes :

Introduction to casting processes, Patterns: Pattern materials, types of pattern, allowances pattern design, Moulding sand, Properties of moulding sands, Core making, Melting practices and furnaces, Pouring and Gating system design,Cleaning and Finishing of casting, Defects and remedies, Principle and equipments of Permanent mould casting, Investment casting, Centrifugal casting, Continuous casting

Unit 2 **(09 Hours)**

Metal Forming: Rolling and Forging Processes

Introduction to Rolling; Flat-rolling Process, Flat-rolling Practice: Defects in Rolled Plates and Sheets; Rolling Mills; Various Rolling Processes and Mills.

Introduction to forging, Open-die forging; Impression-die and Closed-die forging; various forging Operations; Forging Defects.

Unit 3 **(09 Hours)**

Extrusion, Drawing & Forming :

Introduction; Extrusion Process; Hot Extrusion; Cold Extrusion: Impact extrusion, Hydrostatic Extrusion; Extrusion Defects.

Drawing Process; Drawing Defects.

Introduction to sheet metal forming, press working operations, types of bending, presses for sheet metal drawing.

Unit 4 **(09 Hours)**

Joining Processes:

Oxy-fuel-gas Welding; Arc-Welding Processes: Non consumable Electrode; Arc-welding Processes: Consumable Electrode, Shielded Metal-arc Welding, Submerged-arc Welding, Gas Metal-arc welding.

Introduction to solid state welding, Friction Welding, Resistance Welding: Spot, Seam, Projection welding. Introduction to brazing and soldering.

Unit 5 **(09 Hours)**

Machining Processes: Turning, Hole Making :

Introduction; The Turning Process; Lathes and Lathe Operations: Lathe Components, Work holding Devices and Accessories, Types of Lathes. Types of chips, Drilling Machines: Drills, Drill Materials and Sizes, Reaming operation and Reamers; Tapping and Taps.

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Texts/References:

1. Serope Kalpak Jain and Steven R. Schmid, "Manufacturing Engineering and Technology", Addison Wesley Longman (Singapore) Pte. India Ltd., 6th edition, 2009
2. 2. P. N. Rao, "Manufacturing Technology Vol. I & II" , Tata McGraw-Hill Publishers.
3. 3. R. K. Jain, "Production Technology", Khanna Publishers
4. 4. Hajara Choudhary, Bose S K, Elements of Workshop Technology Vol I and II, Asia Publishing House
1. B. S. Raghuvanshi , Workshop Technology Vol.I and Vol.II Dhanpat Rai Publications,2009.
2. Ben Milkell P. Groover, " Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", John Wiley and Sons, New Jersey, 4th edition, 2010.
3. P. C. Sharma A Textbook of Production Technology, S. Chand & Company. Ltd.

Subject Code	Fluid Mechanics	Teaching Scheme	Credits
BTME25MD505A		03L - 00T - 00P	03

Teaching Scheme	Examination Scheme
Theory: 2 hr./week Tutorial : Practical:	Continuous Assessment: 20 Marks Mid-Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course Objective

1.	To introduce fundamental fluid properties and principles of hydrostatics including pressure and buoyancy
2.	To develop understanding of fluid kinematics and dynamics through flow classification and application of Bernoulli's equation
3.	To analyze viscous and turbulent flow behavior in pipes and channels
4.	To apply dimensional analysis and evaluate energy losses in pipe systems
5.	To understand the construction, working, and performance parameters of centrifugal pumps

Course Outcomes: At the end of course, students will be able to:

CO1	Explain fluid properties and calculate hydrostatic forces on various surfaces including floating bodies
CO2	Classify types of fluid flow and apply Bernoulli's equation to practical devices like Venturi and Pitot tubes
CO3	Analyze viscous and turbulent flow in pipes and determine associated losses
CO4	Perform dimensional analysis and assess energy transmission and losses in complex pipe networks
CO5	Describe the working of centrifugal pumps and evaluate their performance based on head, efficiency, and speed

Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	2	1	1	1	1	1	1
CO2	3	3	2	1	2	1	1	1	1	1	1
CO3	3	3	2	1	2	1	1	1	1	1	1
CO4	3	3	2	1	2	1	1	1	1	1	1
CO5	3	3	2	1	2	1	1	1	1	1	1

Course Contents:

Unit 1: Fluid properties & Hydrostatic [09 Hours]

Fluid properties & its definitions, definition of fluid, Viscosity, Bulk modulus of elasticity, Vapour pressure, Surface tension, Capillarity, Manometers (No numerical on manometers), Pascal's law, Hydrostatic law its derivation, Total pressure & Centre of pressure on vertical, horizontal surfaces.

Unit 2: Fluid Kinematics and Dynamics [09 Hours]

Types of flow, Definition of steady, Unsteady, Uniform, Non uniform, Laminar, Turbulent, Compressible, incompressible, rotational, Irrotational flow, 1D flows, Stream line, Streak line, concept

of Velocity, potential & stream function flow net (no numerical treatment), Continuity equation for steady, Unsteady, Bernoulli's equation

Unit 3: Viscous Flow and Turbulent Flow [09 Hours]

Introduction to flow of viscous fluid through circular pipes, two parallel plates derivation and numerical. Turbulent Flow**:** Reynolds's experiment, frictional loss in pipe flow, shear stress in turbulent flow, major and minor losses.

Unit 4: Flow through Pipes [09 Hours]

Introduction, Loss of energy in pipes, loss of energy due to friction, minor energy losses, flow through pipes in series or compound pipes, equivalent pipe, parallel pipes, branched pipes.

Unit 5: Centrifugal Pump [09 Hours]

Introduction to main parts of centrifugal pump, working & construction of centrifugal pump, types of impellers, types of casings, priming, Work done on centrifugal pump, various heads, multistage centrifugal pump.

Texts / Reference:

1) P. N. Modi, S. M. Seth, "Fluid Mechanics and Hydraulic Machinery", Standard Book House, 10th edition,1991.
2) Robert W. Fox, Alan T. McDonald, "Introduction to Fluid Mechanics", John Wile and Sons, 5thedition.
3) V. L. Streeter, K. W. Bedfordand E. B. Wylie, "Fluid Dynamics", Tata McGraw-Hill, 9thedition, 1998.
4) S. K. Som, G.Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill, 2ndedition, 2003.

Subject Code	Fluid Mechanics Lab	Teaching Scheme	Credits
BTME25MD509L		00L - 00T - 02P	01

Teaching Scheme	Examination Scheme
Theory: Tutorial : Practical: 2 hr./week	Continuous Assessment: 50 Marks Mid-Semester Exam: - End Semester Exam: - 50 Marks

Course Objective

1.	To provide hands-on exposure to fluid mechanics basics through lab experiments.
2.	To visualize and understand different flow regimes and fluid behavior.
3.	To experimentally verify important laws and principles of fluid mechanics.
4.	To develop competence in using fluid mechanics laboratory instruments and measurement techniques.
5.	To analyze experimental data and draw meaningful engineering conclusions

Course Outcomes: At the end of course, students will be able to:

CO1	Understanding of fluid flow characteristics such as laminar, turbulent flow, and hydraulic jump.
CO2	Verify fundamental principles of fluid mechanics including Bernoulli's theorem, Reynolds number, and momentum equation.
CO3	Measure and analyze flow parameters like pressure, discharge, viscosity, and velocity using laboratory equipment.
CO4	Conduct experiments, analyze data, and interpret results to draw valid conclusions.
CO5	Use appropriate fluid mechanics instruments and modern engineering tools effectively and safely.

Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	2	1	1	1	1	1	2
CO2	3	3	2	2	2	1	1	1	1	1	2
CO3	3	2	1	3	3	1	1	1	1	1	2
CO4	2	3	2	3	2	1	1	2	2	1	3
CO5	2	2	1	2	3	1	2	2	1	1	2

List of Practical's /Experiments/Assignments (Any 8)

1. Flow visualization technique: characteristics of laminar and turbulent flow patterns using Helleshaw Apparatus.
2. Verification of Bernoulli's theorem
3. Determination of Critical Reynolds number using Reynolds Apparatus
4. Determination of pressure drop in pipes of various cross-sections
5. Determination of pressure drops in pipes of various pipe fittings etc.
6. Viscosity measurement using viscometer (at least one type)
7. Verification of the momentum equation using impact of jet apparatus.
8. Determination of metacentric height of a floating body
9. Calibration of a selected flow measuring device and Bourdon pressure gauge
10. Pressure measurements using various types of manometers, Bourdon type pressure gauge.
11. Study of hydraulic jump.

Subject Code BTME25MD606A	Theory of Machines	Teaching Scheme 02L - 00T - 00P	Credits 02

Teaching Scheme	Examination Scheme
Theory: 3 hr./week Tutorial : Practical:	Continuous Assessment: 20 Marks Mid-Semester Exam: 20 Marks End Semester Exam: 60 Marks

Course objective:

1	To familiarize students with basic definitions and terminology related to mechanisms including links joints, kinematic chains, and degrees of freedom.
2	To develop skills in analyzing mechanisms for their displacement, velocity, and acceleration at any point, using both graphical and analytical methods.
3	To understand and evaluate the performance of friction-based components like clutches.
4	To familiarize students with the working principles of different types of brakes used in machines and power measurement by Dynamometer.
5	To provide transmission system by belt and rope drive.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Identifying and analyzing various machine elements and mechanisms, determining the position, velocity, and acceleration of linkages
CO2	The ability to analyze the motion (position, velocity, and acceleration) of elements, understand and apply principles of kinematic pairs, chains, and their inversions, and use both graphical and analytical methods to solve kinematic problems for practical applications.
CO3	Students can evaluate the friction forces required to hold a system in static equilibrium also can explain methods to increase or decrease friction
CO4	Understanding the principles of different types of brakes and dynamometers, analyzing their performance, calculating braking effort, and evaluating their application in various machines
CO5	Choose an appropriate drive type based on dimension belts and rope ,application-specific factors, such as power requirements, speed ratio, and center distance between shafts

Mapping of course outcomes with program outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	2	1	1	1	1	1	1
CO2	3	3	2	1	2	1	1	1	1	1	1
CO3	3	3	2	1	2	1	1	1	1	1	1
C04	3	3	2	1	2	1	1	1	1	1	1
C05	3	3	2	1	2	1	1	1	1	1	1

Course Contents

Unit 1 Introduction **[06 Hours]**

Definition of link, pair, kinematics chain, inversions, inversions of single and double slider crank chain, kinematic diagrams of mechanisms, equivalent linkage of mechanism, degree of freedom. Study of various mechanisms such as straight line mechanisms, pantograph. Instantaneous center of rotation, Kennedy's theorem and its applications.

Unit 2: Velocity Acceleration Analysis **[06 Hours]**

Velocity and acceleration analysis and its purpose, velocity and acceleration diagrams using ICR method, Velocity and acceleration of piston in slider crank mechanism by analytical method and Klein's construction.

Unit 3: Friction **[06 Hours]**

Types of friction, Law of friction, Limiting angle of friction, Angle of repose, Friction Circle, friction between nut and screw with V and square types of threads.

Friction Clutches: Single plate and multi-plate clutch, Cone clutch, Centrifugal clutch.

Unit 4: Brakes and Dynamometers **[06 Hours]**

Brakes: Shoe brake, Internal and external shoe brakes, Block brakes, Band brakes, Band and block brakes, Braking torque.

Dynamometers: Different types of absorption and transmission type dynamometers, Construction and working of eddy current dynamometer, Torque measurement.

Unit5: Belt and Ropes Drives **[06 Hours]**

Introduction, Belt and Rope drives, Effect of slip on velocity ratio, Creep of belt, Law of belting, length of belt, Power transmitted by belt, ratio of driving tensions, centrifugal tension, initial tension in belt, power transmitted by belt.

References:

1. Thomas Beven, "Theory of Machines", CBS Publishers and Distributors, Delhi.
2. J. E. Shigely, J. J. Uicker, "Theory of Machines and Mechanisms", Tata McGraw Hill Publications, New York, International Student Edition, 1995.
3. V. P. Singh**,** "Theory of Machines", Dhanpat Rai & Co. Publication, New Delhi, 4th edition 2016
4. A. Ghosh, A. K. Malik, "Theory of Mechanisms and Machines", Affiliated East-West Press Pvt. Ltd., New Delhi.
5. S. S. Rattan, "Theory of Machines", Tata McGraw Hill, New Delhi.

Subject Code BTME25MD705A	Machine Design	Teaching Scheme 02L - 00T - 00P	Credits 02

Teaching Scheme	Examination Scheme
Theory: 3 hr./week Tutorial : Practical:	Continuous Assessment: 20 Marks Mid-Semester Exam: - 20 Marks End Semester Exam: - 60 Marks

Course objective:

1	Understand the mechanical engineering design process, including standardization, ergonomics, aesthetics, and quality systems such as ISO 9000.
2	Apply theories of failure to design machine elements subjected to static and combined loading conditions.
3	Analyze and design machine components subjected to fluctuating and fatigue loads using appropriate fatigue criteria.
4	Design transmission elements such as shafts, keys, and couplings considering strength, rigidity, and relevant design codes.
5	Design threaded joints, power screws, and mechanical springs by evaluating stresses, efficiency, and deflection characteristics.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Explain the mechanical engineering design process, design considerations, standardization practices, ergonomics, and preferred sizes.
CO2	Analyze and design machine elements under static loading using appropriate theories of failure.
CO3	Design machine elements subjected to fluctuating and fatigue loads using Soderberg, Goodman criteria, and cumulative damage concepts.
CO4	Design shafts, keys, and couplings for power transmission considering strength, stiffness, and applicable design standards.
CO5	Design threaded joints, power screws, and helical springs by evaluating stresses, efficiency, and deflection behavior.

Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	2	-	1	2	1	-	1	1	2
CO2	3	3	2	1	2	-	-	-	-	1	1
CO3	3	3	2	2	2	-	-	-	-	-	2
CO4	3	2	3	1	3	-	-	1	-	2	1
CO5	3	2	3	1	2	-	-	-	-	1	1

Course Contents:

Unit 1 Mechanical Engineering Design Methodology and Ergonomics (06 Hours)

General industrial design procedure, use of standardization, preferred series, use of design data book, Introduction to ISO 9000, aesthetic considerations in design. Ergonomic considerations in design.

Unit 2 Design of Machine Elements under Static Loading (06 Hours)

Theories of Failure (Yield and Fracture Criteria): Maximum normal stress theory, Maximum shear stress theory, Maximum distortion energy theory, Numerical on Failure theories, comparison of various

theories of failure, Direct loading and combined loading, Joints subjected to static loading e.g. cotter joint.

Unit 3 Fatigue and Fluctuating Load Design of Machine Elements (06 Hours)

Stress concentration, stress concentration factors, fluctuating stresses, fatigue failure, endurance limit, notch sensitivity, approximate estimation of endurance limit, design for finite life under reversed stresses, design for infinite life under reversed stresses, cumulative damage in fatigue, Soderberg and Goodman diagrams, fatigue design under combined stresses.

Unit 4 Design of Shafts Keys and Couplings (06 Hours)

Various design considerations in transmission shafts, splined shafts, spindle and axles strength, lateral and torsional rigidity, ASME code for designing transmission shaft. Types of Keys: Classification and fitment in keyways, Design of various types of keys.

Couplings: Design consideration, design of rigid & muff couplings Design of flange type couplings. design of flexible couplings.

Unit 5 Design of Threaded Joints and Mechanical Springs (06 Hours)

Forms of threads used for power screw and it's applications, torque analysis for Square threads, efficiency of screw, overall efficiency, self-locking in power screws, stresses in the power screw. Design of screw and nut, differential and compound screw,

Stress deflection equation for helical spring, Wahl's factor, style of ends, shot peening.

Text/Reference Books:

1. V. B. Bhandari, *Design of Machine Elements*, Tata McGraw Hill Publications, New Delhi, 2008.
2. R. L. Norton, *Machine Design: An Integrated Approach*, Pearson Education, Singapore, 2001.
3. R. C. Juvinall, K. M. Marshek, *Fundamentals of Machine Component Design*, John Wiley & Sons Inc., New York, 3rd edition, 2002.
4. B. J. Hamrock, B. Jacobson, S. R. Schmid Sr., *Fundamentals of Machine Elements*, International Edition, New York, 2nd edition, 1999.
5. A. Shal, A. R. Holowenko, H. G. Langhlin, *Theory and Problems of Machine Design*, Schaum's Outline Series, Tata McGraw Hill Book Company, New York, 1982.
6. J. E. Shigley, C. R. Mischke, *Mechanical Engineering Design*, Tata McGraw Hill Publications, 7th edition, 2004.
7. M. F. Spotts, *Design of Machine Elements*, Prentice Hall of India, New Delhi.