

KURUKSHETRA UNIVERSITY, KURUKSHETRA
 Established by the State Legislature Act XII of 1956
 ('A+' Grade, NAAC Accredited)
MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING
 (CREDIT BASED) (w. e. f. 2018-19)
SPECIALIZATION: INDUSTRIAL & PRODUCTION ENGINEERING
SEMESTER-II

Sr. No.	Course Code	Course Name	L	T	P	Hrs./ Week	Credits	Major Test	Minor Test	Practical	Total	Duration of Exam (Hrs.)
1	MTIP-102A	Mechatronics	3	0	0	3	3	60	40	-	100	3
2	MTIP-104A	Industrial Tribology	3	0	0	3	3	60	40	-	100	3
3		*Programme Elective-III	3	0	0	3	3	60	40	-	100	3
4		**Programme Elective-IV	3	0	0	3	3	60	40	-	100	3
5	MTIP-118A	Mechatronics Lab	0	0	4	4	2	-	40	60	100	3
6	MTIP-120A	Industrial Tribology Lab	0	0	4	4	2	-	40	60	100	3
7	MTIP-122A	Mini Project	0	0	4	4	2	-	-	100	100	3
8		***Audit Course-II	2	0	0	2	-	-	100	-	100	3
Total						26	18	240	240	220	700	

***PROGRAMME ELECTIVE-III (I&P) for 2nd Semester**

1.	MTIP-106A	Advanced Welding Processes
2.	MTIP-108A	Advanced Metal Cutting
3.	MTIP-110A	Metrology

****PROGRAMME ELECTIVE - IV (I&P) for 2nd Semester**

1.	MTIP-112A	Sequencing and Scheduling
2.	MTIP-114A	Quality Engineering and Management
3.	MTIP-116A	Reliability Engineering

*****AUDIT COURSE-II for 2nd Semester (I&P)**

1.	MTAD-102A	Constitution of India
2.	MTAD-104A	Pedagogy Studies
3.	MTAD-106A	Stress Management by Yoga
4.	MTAD-108A	Personality Development through Life Enlightenment Skills

Note: 1. ***Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-102A	MECHATRONICS						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 hrs
Objective	The objective of the course is to acquaint the knowledge of electronic devices and electromechanical systems, hydraulic and pneumatic systems, CNC, Robotics and PLC's.						
Course Outcomes							
CO1	To understand the concepts of Mechatronics, fundamental of electronics and digital circuits and electrical actuating circuits.						
CO2	To acquaint the knowledge of hydraulic system with its practical applications.						
CO3	To acquaint the knowledge of pneumatic system with its practical applications.						
CO4	To study the fundamentals of CNC, Robotics and programmable logic controllers (PLC's) and their use.						

UNIT-I

Introduction: The Mechatronics approach: A methodology for integrated design of Mechanical, Electronics and Electrical Control, Computer and Instrumentation.

Fundamentals of Electronics and digital circuits: Number systems: Binary, Octal, Hexadecimal, Conversion from Binary to Decimal, Octal and Hexadecimal and vice-versa, Binary arithmetic: Addition, subtraction, Multiplication and division, Boolean Algebra: Laws, De-Morgan's laws, Logic Gates, Truth tables, Karnaugh maps and logic circuits. Generation of Boolean function from truth tables and simplification, **Electrical actuating system:** Basic principle of electrical switching, Solenoids, Electrical relays, Representation of output devices, Electrical motors: A.C. motors, Stepper motors, Induction motor speed control.

UNIT-II

HYDRAULIC SYSTEMS:

Direction Control Valves: Poppet Valve, Spool Valve, Sliding Spool type DCV, Check Valve, Pilot operated check valve, Restriction check valve, 2 Way valve, 3 way valve, 4 way valve, Manually actuated valve, Mechanically actuated valve, Pilot operated DCV, Solenoid Actuated valve, Rotary Valve, Centre flow path configurations for three position four way valve, Shuttle valve

Pressure Control Valve: Simple and compound pressure Relief Valve, Pressure Reducing Valve, Unloading valve, sequence valve, counterbalance valve, Brake Valve

Flow Control Valves: Fixed and non-adjustable valve, adjustable, throttling, non-pressure compensated pressure control valve, Pressure/temperature compensated flow control valve, Shuttle and Fast exhaust valve, Time delay valve, Flow Control Valves, Fluid Conditioners, Hydraulic Symbols (ANSI), Hydraulic Circuit design: Control of Single and double acting cylinders, double pump Hydraulic System

UNIT-III

PNEUMATIC SYSTEM:

Air Generation and distribution: Air compressors, Air Receiver, Filters, intercoolers, After-coolers, Relief Valve, Air dryers, Primary and secondary lines, Piping layouts, Air Filters, Air Regulators, Air Lubricator, Actuators and output devices, Direction control valves, Flow control valves, junction elements, Pneumatic circuits, Control of Single and double acting cylinders.

UNIT-IV

INTRODUCTION TO CNC MACHINES AND ROBOTICS:

CNC Machines: NC machines, CNC machines, DNC machines, Machine structure, Slidways, Guideways, Slide Drives, Spindle, Robotics: Components of robots, Classification of robots, Robots application

PROGRAMMABLE LOGIC CONTROLLERS

Introduction - Principles of operation - PLC Architecture and specifications - PLC hardware Components, Analog & digital I/O modules, CPU & memory module - Programming devices - PLC ladder diagram, Converting simple relay ladder diagram in to PLC relay ladder diagram. PLC programming Simple instructions - Manually operated switches - Mechanically operated Proximity switches - Latching relays, Applications of PLC.

RECOMMENDED BOOKS:

1. W. Bolton, Mechatronics, Pearson Education.
2. Majumdar, Pneumatic system, TMH.
3. Andrew Parr, Hydraulic and Pneumatic systems, TMH.
4. M.P. Groover, Automation, Production systems and computer integrated manufacturing, TMH.
5. Shetty and Kolk, Mechatronics system design, Thomson learning.
6. Mahalik, Mechatronics, TMH.
7. Anthony Esposito, Fluid power with application, Pearson Education.
8. K.P Ramachandran, M.S Balasundaram, Mechatronics, Wiley India.

Note: The paper will have a total of *NINE questions*. Question No. 1, which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal *weight of 12 marks*. The student will attempt a total of *FIVE questions*, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining/our questions by selecting only one question from each unit.*

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2ndSem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-104A	Industrial Tribology						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time (Hrs.)
3	0	0	3	60	40	100	3
Objective	To develop a solution oriented approach by in depth knowledge of Industrial Tribology and address the underlying concepts, methods and application of Industrial Tribology.						
Course Outcomes							
CO 1	Students will be able to understand the fundamentals of tribology, friction and wear processes in contacts between different materials.						
CO 2	Students will be able to understand the material requirements for tribological applications and different surface treatment techniques.						
CO 3	Students will be able to study different types of lubricants and testing techniques.						
CO 4	Students will be able to study the maintenance and conservation techniques, testing specifications and standards.						

UNIT-I

Fundamentals of Tribology: Introduction to tribology and its historical background, Economic Importance of Tribology. **Friction and Wear:** Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction. Stick-slip friction behavior, frictional heating and temperature rise. Friction measurement techniques.

Wear and wear types. Mechanisms of wear - Adhesive, abrasive, corrosive, erosion, fatigue, fretting, etc., Wear of metals and non-metals. Wear models - asperity contact, constant and variable wear rate, geometrical influence in wear models, wear damage. Wear in various mechanical components, wear controlling techniques.

UNIT-II

Materials for Tribological Applications: An overview of engineering materials having potential for tribological application. Characterization and evaluation of Ferrous and non-ferrous materials for tribological requirements/applications, Composite materials (PM, CMC and MMC) for tribological applications.

Surface treatment techniques: Surface treatment techniques such as carburising, nitriding, induction hardening, hard facing, laser surface treatments, etc with applications, Surface coating techniques such as electrochemical depositions, anodizing, thermal spraying, Chemical Vapour Deposition (CVD), Physical Vapour Deposition (PVD), etc. and their applications.

UNIT-III

Lubrication and lubricants: Boundary Lubrication, Mixed Lubrication, Full Fluid Film Lubrication, Hydrodynamic, Elastohydrodynamic lubrication, Primary role of lubricants in mitigation of friction and wear & heat transfer medium, Composition and properties of lubricants, Fundamentals - Mineral oil based liquid lubricants, Synthetic liquid lubricants, Solid lubricants, greases and smart lubricants, Characteristics of lubricants and greases, Rheology of lubricants, Evaluation and testing of lubricants.

UNIT-IV

Lubricants additives and application: Introduction to lubricant additives, Antioxidants and bearing corrosion inhibitors, Rust inhibitors, Viscosity improvers, Extreme pressure additives.

Consumption and conservation of lubricants: Lubricants for industrial machinery, Maintenance and conservation of lubricating oils, Storage and Handling of lubricants, Used lubricating oil, Environment and health hazards, Disposability and Recycling, Technical regulation for lubricants, Test specifications and standards for maintenance and management of industrial lubricants including greases and used oils, Selection of optimum lubricant for given application.

RECOMMENDED BOOKS:

1. I.M. Hutchings, Tribology, "Friction and Wear of Engineering Material ", Edward Arnold.

2. Gwidon W. Stachowiak, Andrew W. Batchelor, "Engineering Tribology" Butter worth, Heinemann.
3. T.A. Stolarski, "Tribology in Machine Design ", Industrial Press Inc.
4. E.P. Bowden and Tabor. D., "Friction and Lubrication ", Heinemann Educational Books Ltd.
5. A. Cameron, "Basic Lubrication theory ", Longman, U.K.
6. M.J. Neale (Editor), "Tribology Handbook ", Newnes. Butter worth, Heinemann, U.K.

Note: The paper will have a total of *NINE questions*. Question No. 1, which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal *weight of 12 marks*. The student will attempt a total of *FIVE questions*, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining four questions by selecting only one question from each unit.*

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-106A	ADVANCED WELDING PROCESSES						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 hrs
Objective	The main objective of the course is to impart the students with the knowledge of Welding metallurgy and welding processes.						
Course Outcomes							
CO1	To impart knowledge about various Weld metallurgy and Weld arc characteristics.						
CO2	To acquaint students with the various welding power sources and their applications.						
CO3	To impart knowledge to students about Electrode coatings and Metal transfer phenomenon in weld metal transfer.						
CO4	To let student understand the basics of Solid state welding processes and some of the latest welding techniques.						

UNIT-I

WELDING METALLURGY: Introduction, Weld Metal Zone, Theory of solidification of metals and alloys, Homogeneous Nucleation, Heterogeneous Nucleation, Freezing of alloys, Epitaxial Solidification; Effect of Welding speed on Grain structure, Fusion boundary zone, Heat affected zone, Under bead zone, Grain Refined Zone, Partial transformed zone, Properties of HAZ

WELDING ARC: Definition of Arc, Structure and characteristics, Arc efficiency, arc blow, Electrical Characteristics of arc, Types of Welding Arcs, mechanism of arc initiation and maintenance, role of electrode polarity on arc behaviour and arc stability, analysis of the arc. Arc length regulation in mechanized welding processes.

UNIT-II

WELDING POWER SOURCES: Requirement of an Arc welding power sources, basic characteristics of power sources for various arc welding processes, duty cycles, Selection of a static Volt-Ampere characteristic for a welding process, AC/DC welding power source, DC rectifiers, thyristor controlled rectifiers, transistorized units, inverter systems, Mathematical Problems on Static volt ampere characteristics

UNIT-III

COATED ELECTRODES: Electrode coatings, classification of coatings of electrodes for SMAW, SAW fluxes, role of flux ingredients and shielding gases, classification of solid and flux code wires.

METAL TRANSFER & MELTING RATE: Mechanism and types of metal transfer, forces affecting metal transfer, modes of metal transfer, metal transfer in various welding processes, effective of polarity on metal transfer and melting rate.

UNIT-IV

SOLID STATE WELDING: Theory and mechanism of solid state welding, techniques and scope of friction welding, diffusion welding, cold pressure welding and ultrasonic welding, high energy rate welding, analysis of the Process.

WELDING TECHNIQUES: Technique, scope and application of the electron beam and laser welding processes, under water welding - process & problem.

RECOMMENDED BOOKS:

1. Raymond Sacks, –Welding: Principles & Practices II McGraw-Hill
2. R.S.Parmar, –Welding processes & Technology II, Khanna Publishers
3. R.S.Parmar, –Welding Engineering & Technology II, Khanna Publishers
4. S.V. Nandkarni, –Modern Arc Welding Technology, Oxford & IBH publishing Co.
5. L.M.Gourd, –Principles of Welding Technology II, ELBS/ Edward Arnold.
6. Richard L. Little –Welding & Welding Technology II, Mc-Graw Hill.
7. Cary, Howard –Modern Welding Technology, prentice Hall, 1998.
8. Rossi –Welding Technology II, Mc-Graw Hill.

Note: The paper will have a total of *NINE questions*. Question No. 1, which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2ndSem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-114A	QUALITY ENGINEERING AND MANAGEMENT						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 hrs
Objective	The main objective of the course is to impart the students with the knowledge of quality tools and engineering for the improvement of product quality.						
Course Outcomes							
CO1	To understand the statistical concepts of quality and quality statistics.						
CO2	To study the quality control charts in production process and practice for its use in problem solving.						
CO3	To understand the quality improvement tools.						
CO4	To study the ISO systems, failure analysis and testing.						

Unit-I

Introduction to Quality: An Historical Overview: Defining Quality, The Total Quality System, Total Quality Management, Economics of Quality, Quality, Productivity, and Competitive Position, Quality Costs, Success Stories.

Statistics for Quality: Variability in Populations, Some Definitions, Quality vs. Variability, Section I: Empirical Methods for Describing Populations, Section II: Mathematical Models for Describing Populations, Section III: Inference of Population Quality from a Sample.

Unit-II

Quality in Design: Planning for Quality, Product Planning, Product Design, Process Design.

Quality in Production-Process Control I: Process Control, The Control Charts, Measurement Control Charts, Attribute Control Charts, Summary on Control Charts, Process Capability, Measurement System Analysis,

Quality in Production-Process Control II: Derivation of Limits, Operating Characteristics of Control Charts, Measurement Control Charts for Special Situations.

Unit-III

Quality in Procurement: Importance of Quality in Supplies, Establishing a Good Supplier Relationship, Choosing and Certifying Suppliers, Specifying the Supplies Completely, Auditing the Supplier, Supply Chain Optimization Using Statistical Sampling for Acceptance,

Continuous Improvement of Quality: The Need for Continuous Improvement, The Problem-Solving Methodology, Quality Improvement Tools, Lean Manufacturing.

Unit-IV

A System for Quality: The Systems Approach, Dr. Deming's System, Dr. Juran's System, Dr. Feigenbaum's System, Baldrige Award Criteria, ISO 9000 Quality Management Systems, ISO 9001:2008 Requirements, The Six Sigma System.

RECOMMENDED BOOKS:

1. Grant & Leaveworth, Statistical Quality Control, McGraw Hill
2. Duncan, Quality Control & Industrial Statistics, Irwin Press
3. Juran, Quality Control Handbook, McGraw Hill.
4. Hansen, Quality Control, Prentice Hall
5. Thomason, An Introduction to reliability & control, Machinery Publishing.
6. A.V. Taylor, Total Quality Control, McGraw-Hill
7. K.S. Krishnamoorthi, V. Ram Krishnamoorthi, A First Course in Quality Engineering: Integrating Statistical and Management Methods of Quality, Second Edition, CRC Press.

Note: The paper will have a total of *NINE questions*. Question No. 1, which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units). All questions will have equal *weight of 12 marks*.

The student will attempt a total of *FIVE* questions, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining four questions by selecting only one question from each unit.*

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2nd Sem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-118A		MECHATRONICS LAB						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Practical	Total	Time
0	0	4	2	-	40	60	100	3 hrs
Objective	To practice on electrical circuits, hydraulic and pneumatic systems and PLC's for their practical implications.							
Course Outcomes								
CO1	To understand the PLC using PLC simulators.							
CO2	To demonstrate and actuate the positioning using sensors, actuators and programming.							
CO3	To study the pneumatic and electro-pneumatic training system with simulation software.							
CO4	To design and test on hydraulic and pneumatic circuits.							

List of Experiments

1. To study and conduct exercises on PLC Simulator.
2. Control of conveyor manually and through programming, also programming using sensors and conveyor.
3. To study and conduct exercise on CNC lathe.
4. To study and conduct exercises on Robotic simulation software.
5. To study and conduct exercises on Pneumatic & Electro-Pneumatic Training System.
6. To study the stepper motor interface with PLC.
7. **Design and testing of hydraulic circuits such as**
 - i) Pressure control
 - ii) Flow control
 - iii) Direction control
 - iv) Design of circuit with programmed logic sequence, using an optional PLC in hydraulic. Electro hydraulic Trainer.
8. **Design and testing of pneumatic circuits such as**
 - i. Pressure control
 - ii. Flow control
 - iii. Direction control
 - iv. Circuits with logic controls
 - v. Circuits with timers
 - vi. Circuits with multiple cylinder sequences in Pneumatic Electro pneumatic Trainer.
9. To perform exercises on process control trainer.

Note: At least eight experiments should be performed from the above list.

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2ndSem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-120A		INDUSTRIAL TRIBOLOGY LAB						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Practical	Total	Time
0	0	4	2	-	40	60	100	3 hrs
Objective	To study friction, wear mechanism of materials and performance of lubricants under various test conditions using concepts, methods and application of Industrial Tribology.							
Course Outcomes								
CO1	Students will be able to explain the friction phenomena and different wear processes in contacts between metallic, ceramic and polymeric surfaces.							
CO2	Students will be able to determine different types of lubricants, their grades, test standards and different properties of lubricants.							
CO3	Students will be able to understand the causes of tribological failures and surface characterization.							
CO4	Students will be able to use different types of tribo-test equipments and design of wear and friction test.							

List of Experiments

1. To study the friction and wear properties of a specimen (metallic/polymeric/ceramic surfaces) using wear and friction monitoring apparatus under dry sliding conditions.
2. To study the friction and wear properties of a specimen (metallic/polymeric/ceramic surfaces) using wear and friction monitoring apparatus under wet sliding conditions.
3. To study the effect of temperature on the friction and wear performance of composite materials using high temperature pin/ball on disc tester.
4. To study the variation of viscosity of lubricants with temperature.
5. To evaluate the wear and extreme pressure properties of a lubricating oil/ grease using four ball tester.
6. To study the surface characterization of wear components.
7. To study different types of industrial abrasives materials, properties and applications.
8. To determine abrasion index of a material with the help of dry abrasion test rig.
9. To access the adhesion and scratch resistance of surface coatings (hard or soft) using Scratch Tester.
10. To determine the erosive wear rate of different materials using Air Jet Erosion Tester under different conditions.
11. To demonstrate the pressure distribution of a lubricant in a journal bearing.

Note: At least eight experiments should be performed from the above list.

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2ndSem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-122A		MINI PROJECT						
Lecture	Tutorial	Practical	Credits	Major Test	Minor Test	Practical	Total	Time (Hrs.)
0	0	4	2	-	-	100	100	3
Objective	In case of mini project, they will solve a live problem using software/analytical/computational tools or fabricate an experimental setup.							
Course Outcomes								
CO 1	Students will learn to write technical reports.							
CO 2	Students will develop skills to present and defend their work in front of technically qualified audience.							

Students can take up small problems in the field of Industrial and Production engineering as mini project. It can be related to solution to an engineering problem, verification and analysis of experimental data available, conducting experiments on various engineering subjects, material characterization, studying a software tool for the solution of an engineering problem etc.

Students will be required to submit a brief synopsis of 3-4 pages related to the topic by the first week of September.

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (2ndSem.)
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTAD- 102A		CONSTITUTION OF INDIA					
Lecture	Tutorial	Practical	Credits	Major Test	Minor Test	Total	Time (Hrs.)
2	0	0	-	-	100	100	3
Objective							
The main objective of the course is to impart the students with the knowledge of informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.							
Course Outcomes							
CO1	To discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.						
CO2	To discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.						
CO3	To discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.						
CO4	To discuss the passage of the Hindu Code Bill of 1956.						

Unit-I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution: Preamble, Salient Features

Unit-II

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality, Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

Unit-III

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit-IV

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

RECOMMENDED BOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar, "framing of Indian Constitution", 1st Edition, 2015.
3. M. P. Jain, "Indian Constitution Law", 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, "Introduction to the Constitution of India", Lexis Nexis, 2015.