

**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-1**

Sr. No.	Course Code	Course Name	L	T	P	Hrs./ Week	Credits	Major Test	Minor Test	Practical	Total	Duration of Exam (Hrs.)
1	MTIP-101A	Advanced Metal Casting	3	0	0	3	3	60	40	-	100	3
2	MTIP-103A	Computer Aided Design and Manufacturing	3	0	0	3	3	60	40	-	100	3
3		*Programme Elective-I	3	0	0	3	3	60	40	-	100	3
4		**Programme Elective-II	3	0	0	3	3	60	40	-	100	3
5	MTRM-111A	Research Methodology and IPR	2	0	0	2	2	60	40	-	100	3
6	MTIP-117A	Advanced Metal Casting Lab	0	0	4	4	2	-	40	60	100	3
7	MTIP-119A	Computer Aided Design and Manufacturing Lab	0	0	4	4	2	-	40	60	100	3
8		***Audit Course-I	2	0	0	2	-	-	100	-	100	3
<b>Total</b>						<b>24</b>	<b>18</b>	<b>300</b>	<b>280</b>	<b>120</b>	<b>700</b>	

**\*PROGRAMME ELECTIVE- I (I&P) for 1<sup>st</sup> Semester**

1.	MTIP-105A	Tool Engineering
2.	MTIP-107A	Advanced Engineering Materials
3.	MTIP-109A	Non-Conventional Machining

**\*\*PROGRAMME ELECTIVE- II ( I & P ) for 1<sup>st</sup> Semester**

1.	MTIP-111A	Product Design and Development
2.	MTIP-113A	Simulation of Industrial Systems
3.	MTIP-115A	Supply Chain Management

**\*\*\*AUDIT COURSE – I for 1<sup>st</sup> Semester (I&P)**

1.	MTAD-101A	English for Research Paper Writing
2.	MTAD-103A	Disaster Management
3.	MTAD-105A	Sanskrit for Technical Knowledge
4.	MTAD-107A	Value Education

**Note:** 1. The course of program elective will be offered at 1/3<sup>rd</sup> or 6 numbers of students (whichever is smaller) strength of the class.

2. \*\*\*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.

# ***First Semester***

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1<sup>st</sup>Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-101A	ADVANCED METAL CASTING						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 hrs
<b>Objective</b>	The main objective of the course is to impart the students with the knowledge of moulding and casting.						
<b>Course Outcomes</b>							
<b>CO1</b>	To impart knowledge about various functional requirements of moulding materials and specifications and testing of moulding sand properties.						
<b>CO2</b>	To acquaint students with the phenomenon of solidification and analytics involved in solidification of Molten metal in various types of mould metal combinations.						
<b>CO3</b>	To impart knowledge to students about Gating system design and Riser design for getting an accurately designed defect free casting.						
<b>CO4</b>	To let student understand some special casting processes and testing of casting.						

**UNIT-I**

**Functional Requirement of Moulding Materials:** Principal ingredients of moulding Sands; Different Types of Sands; Clays, Different types of Clay structures, Moisture; Theories of Clay sand bonding, Sand system equipment, Flow of sand in a mechanized foundry, The Requirement of core sands,.

**Specification and testing of Moulding Sands**

Grain Size, Grain Shape, Clay content, Moisture Content, Bulk Density and Specific Surface Area, Acid Demand Value (ADV), Fines Content, Sintering Temperature, Mould hardness, Permeability, Strength, Deformation & toughness, Compactability, Mouldability, High Temperature Characteristics.

**UNIT-II**

**Solidifications of Metals,** Nucleation, free energy concept, critical radius of nucleus, Distribution coefficient and Constitutional Undercooling, Solidification in Pure Metals and Alloys, Directional Solidification, Casting Characteristics related to Solidification; Fluidity, Dendritic Growth, Dendrite coherency, Segregation, Inverse Segregation, Hot tearing, Hipping, Solidification under pressure.

**Heat Transfer during casting process:** Resistance to Heat Transfer, Centerline Feeding Resistance, Rate of solidification, Solidification of Large casting in an insulating mould, Solidification with predominant interface resistance, Solidification with constant casting surface temperature, Solidification with predominant resistance in mould and solidified Metal, Solidification Time and Chvorinov rule, Numerical Exercises.

**UNIT-III**

**Gating System Design:** Gating system defined, Types of Gating Systems, Types of Gates, Elements of Gating System, Gating System design, Factors involved in Gating design, Pouring time, Choke Area, Sprue design, Gating Ratio, Sprue runner gate ratio, Elimination of Slag and Dross, Filtration, Numerical exercises.

**Riser Design:** Need for riser, Basic requirements of an effective feeding system for a casting, Feeding Efficiency, Types of Risers, Effective feeding distances for simple and complex shapes. Use of chills, Directional solidification, Stresses in castings, Metal Mould reactions, Chaine's Method, Modulus Method, Naval Research Laboratory (NRL) Method, Pouring rate and Temperature, Padding, Use of exothermic materials, Chills, Feeding Aids, Numerical exercises.

**UNIT-IV**

**Special casting Processes:** Shell Moulding, Investment Casting, Permanent Mould Casting, Diecasting, Centrifugal casting.

**Inspection and testing of casting:** Visual, Optical, Dimensional inspection, Laser Scanning, White light scanning, Radiographic Inspection, ultrasonic testing, Magnetic Particle Testing, dye penetration, Casting Defects; Classification, Causes and remedies.

**RECOMMENDED BOOKS:**

1. H.F. Taylor, "Foundry Engineering", John Wiley and Sons.
2. P.L. Jain, "Principles of Foundry Technology", Mc-Graw Hill.
3. MahiSahoo and SudhariSahu, "Principles of Metal Casting.
4. AmitabhaGhosh, " Manufacturing Science", Affiliated East West Press.
5. P.N Rao, "Manufacturing Technology: Foundry, Forming and Welding" TMH.
6. K.P. Sinha, "Foundry Technology", Standard Publishers, Delhi.

7. Flinn, "Fundamentals of Metals Casting", Addison Wesley.
8. Heine Loper and Resenthal, "Principles of Metal Casting", Mc-Graw Hill.
9. Hielel and Draper, "Product Design & Process Engineering", Mc-Graw Hill.
10. Salman & Simans, "Foundry Practice", Issac Pitman.
11. ASME, "Metals Handbook- Metal Casting."
12. P.C. Mukharjee, Fundamentals of Metal casting Technology, Oxford, IBH.
13. P.R. Beeley, Foundry Technology, Butterworth Heinmann

**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 (1<sup>st</sup> Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-109A	NON-CONVENTIONAL MACHINING						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 hrs
<b>Objective</b>	To acquaint the students with the advanced technologies and processes in various streams of Non-conventional machining.						
<b>Course Outcomes</b>							
<b>CO1</b>	To impart knowledge of Various Non-conventional Mechanical Working Processes, technology, process parameters and analysis for metal removal for these processes.						
<b>CO2</b>	To acquaint students with deep knowhow about chemical and electrochemical machining processes,						
<b>CO3</b>	To impart knowledge to students about various kinds of Electric discharge machining processes, process parameters associated with these processes and various process characteristics.						
<b>CO4</b>	To let student understand the working and technology associated with Laser Beam machining and Electron beam machining processes.						

**UNIT-I**

Introduction, Need of Non-conventional machining processes, Characteristics of conventional and Non-conventional Machining processes. **Mechanical Working Processes: Abrasive Jet Machining:** Machining setup, Abrasives, Process Parameters, Machining Characteristics, Material removal models in AJM, Process capability, Advantages, limitations, Applications

**Water Jet Machining:** Basic mechanism of Water jet machining setup, Process parameters, Catcher, Process capabilities, Advantages, limitations, Applications **Abrasive Water Jet Machining process:** Working Principle, AWJM Machine, Process Variables, Mechanism of Metal Removal, Cutting Parameters, Process capabilities, Applications, Environmental issues.

**Ultrasonic Machining:** Fundamental principles, Equipment, Magnetostriction, Elements of process, Mechanics of cutting, Analysis of Process Parameters, Process capabilities, Economic considerations. Applications, Limitations

**UNIT-II**

**Chemical Machining:** Introduction, Fundamental Principles, Process Parameters; Maskants and Etchants, Advantages, Limitations, Applications.

**Electrochemical Machining Processes:** Introduction, Classification of ECM Processes, Fundamentals Principles of ECM, Elements of ECM, ECM Machine Tool Process, Determination of Metal Removal Rate, Evaluation of Metal Removal of an alloy, Electrochemistry of ECM, Cathode and Anode reaction, Dynamics of ECM, Self-Regulating feature of ECM, Process Parameters, Process capabilities, Electrochemical Deburring. **Electrochemical Grinding:** Schematics, Electrochemistry, Process Parameters, Process capabilities, Applications, Advantages, Limitations.

**UNIT-III**

**EDM:** Introduction, Basic Principles & Schematics, Process Parameters, Characteristics of EDM, Dielectric, Electrode Material, Modelling of Material Removal, Spark Erosion Generators, Analysis and Metal Removal Rate in RC circuit, Selection of Tool Material and Tool Design, Di-Electric system, Process Variables, Dielectric Pollution and its effects, Process Characteristics, Applications, Electric Discharge Grinding and Electric Discharge Diamond Grinding; **Wire EDM:** Working Principle, Wire EDM Machine, Advances in Wire-cut EDM Process Variables, Process Characteristics, Applications.

**UNIT-IV**

**Laser Beam Machining** Back Ground, Production of Laser, Working Principle of LBM, Types of LASERS, Process Characteristics, Metallurgical effects, Advantages and Limitations, Applications.

**Electron Beam Machining:**

Electron Beam Action, Generation and control of Electron beam, Theory of Electron Beam Machining, Process Parameters, Process capabilities, Applications.

High Energy Rate Forming, Electro-Hydraulic Forming, Explosive Forming, Hot Machining Analysis of the Process.

**RECOMMENDED BOOKS:**

1. V.K. Jain, Advanced Machining Processes, Allied Publishers Pvt Ltd
2. P.C. Pandey and H.S. Shan, Modern Machining Processes, Tata McGraw- Hill
3. M. K. Singh, Unconventional Manufacturing Process, New Age Publishers

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1<sup>st</sup> Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-115A		SUPPLY CHAIN MANAGEMENT					
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 hrs
<b>Objective</b>	The main objective of the course is to impart the students with the knowledge of Supply chain and different aspects of supply chain management.						
<b>Course Outcomes</b>							
<b>CO1</b>	To impart knowledge about basics of Supply chain management and Supply chain						
<b>CO2</b>	To acquaint students with the different aspects involved in sourcing and procurement in supply chain management.						
<b>CO3</b>	To impart knowledge to students about Evaluating performance of Supply chain and decision making about Transportation, Storage and warehousing.						
<b>CO4</b>	To let student understand Quantitative tools for SCM, Information Technology in a Supply Chain:						

**UNIT-I**

**Overview of supply chain management:** Introduction, Definition, The Objective of a Supply Chain, The Importance of Supply Chain Decisions, Decision Phases in a Supply Chain, Process Views of a Supply Chain, Examples of Supply Chains.

**Supply chain dynamics:** Introduction, Coping with Dynamics in Supply chain. Bullwhip effect, Analysis of Bullwhip Effect, Impact of Lead time, Inventory management and Supply chain dynamics, offshoring and outsourcing Effect on SC dynamics and cost.

**UNIT-II**

**Outsourcing and Make or Buy Decisions:** Strategic Decisions and Core competencies, Tactical Decisions, Factors influencing make or buy decisions, Control of Production or Quality, Unreliable Suppliers, Suppliers Specialized knowledge and research, Small Volume Requirements, Limited Facilities, Workforce Stability, Multiple Sourcing Policy, Managerial and Procurement considerations, the Volatile nature of Make/Buy situation, Administration: Procedures and Personal.

**Sourcing of Supply:** Importance of Source Selection, Responsibilities for Source Selection, Evaluating a potential supplier, The criticality of Qualifying Sources, Competitive Bidding and Negotiation, Prerequisite for competitive bidding, Two step Bidding/Negotiation, Benefits and Risks of International Sourcing, Identifying and Qualifying an International Source.

**UNIT-III**

**Supply Chain Performance: Achieving Strategic fit And Scope:** Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope, Challenges to Achieving and Maintaining, Strategic Fit, Supply chain drivers and metrics, Financial Measures of Performance, Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing.

**Transportation, storage and warehousing:** Introduction, Transportation mode choice, Transport operator decisions, Trucking sectors in India, Rail transport, Air Transport, Water transport, Transport network, Storage and warehousing, types of warehousing, risk pooling, IT Integration: Supply chain information system, Role of IT in SCM process, Business process Re-engineering, Internet and its applications in SCM.

**UNIT-IV**

**Quantitative tools for SCM:** Introduction, Forecasting, Demand forecast, Forecasting strategy & technique, Management of Inventories in SC, Linear programming, Routing models, pricing decisions, Introduction to MCDM approach.

**Information Technology in a Supply Chain:** The Role of IT in a Supply Chain, The Supply Chain IT Framework Customer Relationship Management, Internal Supply Chain Management, Supplier Relationship Management, The Transaction Management Foundation, The Future of IT in the Supply Chain, Risk Management in IT, Supply Chain IT in practice.

**RECOMMENDED BOOKS:**

1. Chopra, S., and Meindl, P., Supply chain Management: Strategy, Planning and Operations. Second Edition, Pearson Education (Singapore) Pte. Ltd, 2004.

2. Rangaraj, Supply Chain Management for Competitive Advantage, TMH.
3. Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., Designing & Managing the Supply Chain: Concepts, Strategies & Case studies. Second Edition, Tata McGraw-Hill Edition, 2003.
4. Doebler, D.W. and Burt, D.N., Purchasing and Supply Chain Management: Text and Cases, McGraw-Hill Publishing Company Limited, New Delhi, 1996.

**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 (1<sup>st</sup> Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

<b>RESEARCH METHODOLOGY AND IPR</b>								
MTRM-111A	Lecture	Tutorial	Practical	Credits	Major Test	Minor Test	Total	Time (Hrs.)
	2	0	0	2	60	40	100	3
<b>Objective</b>		The objective of this course is to make the students capable of formulating the research problems/proposals and get aware about the intellectual property and patent laws.						
<b>Course Outcomes</b>								
<b>CO 1</b>	Student will be able to understand research problem formulation.							
<b>CO 2</b>	Student will be able to analyze research related information and follow research ethics.							
<b>CO 3</b>	Student will be able to understand the Patents, Designs, Trade and Copyright and able to apply the knowledge for patent.							
<b>CO 4</b>	Student will be able to understand the concept of Patent Rights, Licensing and transfer of technology and able to apply the knowledge in new developments in IPR.							

**Unit-I**

Meaning of research problem, Sources of research problem, Criteria, characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

**Unit-II**

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, paper. Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

**Unit-III**

**Nature of Intellectual Property:** Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**Unit-IV**

**Patent Rights:** Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and Institutions.

**RECOMMENDED BOOKS:**

1. Stuart Melville and Wayne Goddard, "Research methodology: An introduction for science & engineering students" Kenwyn, South Africa : Juta & Co. Ltd., 1996
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction" Juta Academic; 2nd edition (April 28, 2004)
3. Ranjit Kumar, "Research Methodology: A Step by Step Guide for beginners" SAGE Publications Ltd; Fourth edition (14 January 2014)
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", Aspen Publishers; Revised edition (July 25, 2007)
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

**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 *weightage* 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 (1<sup>st</sup> Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-117A		ADVANCED METAL CASTING LAB						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Practical	Total	Time
0	0	4	2	-	40	60	100	3 hrs
<b>Objective</b>	The main objective of the course is to impart the students with the knowledge of foundry shop							
<b>Course Outcomes</b>								
<b>CO1</b>	To impart knowledge of practical evaluation of sand grades and moisture content in the moulding sand.							
<b>CO2</b>	To acquaint students with the different aspects involved in testing ADV, Permeability and DCS of Moulding/Core sand.							
<b>CO3</b>	To impart knowledge to students about determining grain size Mould Hardness and Compressive strength of the Mould.							
<b>CO4</b>	To let student understand how to prepare MMCs using Stir Casting process.							

**List of Experiments:**

1. To perform grading of sand for foundry purpose.
2. Determination of optimum moisture content in Green Sand Practice.
3. Determination of DCS of core sand.
4. Determination of permeability for molding sand mixtures.
5. Determination of acid demand value in a moulding sand sample.
6. To determine mould hardness.
7. To determine grain size and gran fines content in moulding Sand.
8. To determine compressive strength of the given mould sample
9. To determine grain size distribution and grain fines number for a sand mix.
10. To prepare advanced Metal Matrix Composites using Stir Casting.

**Note: At Least eight experiments need to be performed by the students from the above mentioned list.**

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1<sup>st</sup> Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTIP-119A		COMPUTER AIDED DESIGN AND MANUFACTURING LAB						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Practical	Total	Time
0	0	4	2	-	40	60	100	3 hrs
<b>Objective</b>	To acquaint the students with 2-D and 3-D modeling using design softwares.							
<b>Course Outcomes</b>								
<b>CO1</b>	To understand the basic solid modeling and applied features of the softwares.							
<b>CO2</b>	To learn and practice of surface techniques and surface creations using software.							
<b>CO3</b>	To learn and practice of assembly and detailed drafting.							
<b>CO4</b>	To let student understand how to prepare MMCs using Stir Casting process.							

**List of Experiments:**

The students will be required to carry out the following exercises or their equivalent tasks using a 3-D modeling software package (e.g. Solid-works/ Creo/ Ideas/ Solid Edge/UG/CATIA/ etc.). Practical must be performed on licensed version (Preferably the latest version) of any one of above mentioned software.

**1 BASIC SOLID MODELING****Introduction & sketcher tools**

- a) CAD Tools and Applications: CAD - CAM - CAE
- b) Parametric Feature Based Modelling and Parent-Child Relation
- c) Design Intent and Associativity between 3 Modes
- d) Modelling Software - Getting Started & Graphical User Interface
- e) Sketch Entities and Tools
- f) Dimensioning and Adding Relations to define the Sketch

**Sketched Features (Boss / Base and Cut)**

- a) Base Features
- b) Extrude & Revolve
- c) Reference Geometry, Curves & 3D Sketch
- d) Sweep & Loft

**Editing & Refining Model**

- a) Editing Sketch, Sketch Plane and Editing Feature
- b) Suppress / Un-Suppress Feature and Reordering Feature

**2 ADVANCE FEATURES APPLIED FEATURES**

- a) Patterns & Mirror
- b) Fillet/Round & Chamfer
- c) Hole & Hole Wizard
- d) Draft, Shell, Rib and Scale
- e) Dome, Flex and Wrap

**Multi Body**

- a) Indent Tool
- b) Combine Bodies – Boolean Operations
- c) Split, Move/Copy and Delete Bodies

**Other Tools & Options**

- a) Design Table and Configurations
- b) Adding Equations and Link Values
- c) Tools - Measure and Mass Properties
- d) Appearance - Edit Material, Colour and Texture
- e) Options - System and Document Properties

**3 SURFACING TECHNIQUES BASIC SURFACE CREATIONS**

- a) Extrude & Revolve
- b) Sweep & Loft
- c) Boundary Surface
- d) Planar Surface

**Other Derived Techniques**

- a) Offset Surface
- b) Radiate Surface
- c) Ruled Surface
- d) Fill Surface
- e) Mid Surface

#### **Modify / Edit Surfaces**

- a) Fillet/Round
- b) Extend
- c) Trim &Untrim
- d) Knit Surfaces
- e) Delete and Patch

#### **Surfaces for Hybrid Modelling**

- a) Thicken – Boss / Base and Cut
- b) Replace face
- c) End condition for Sketched feature - Up to Surface or Offset from Surface.
- d) Solid body from closed surfaces

#### **4 ASSEMBLY & MECHANISMS BOTTOM UP ASSEMBLY APPROACH**

- a) Inserting Components/Sub-Assemblies
- b) Adding Mates - Standard & Advance
- c) Editing Mates, Part and Replacing Components

#### **Top down Approach & Mechanisms**

- a) Inserting New Part to Existing Assembly
- b) Use of Layout Sketching
- c) External References - In-context and Out-of-context, Locked and Broken

#### **Assembly Features**

- a) Component Patterns & Mirrors
- b) Cuts & Holes
- c) Belt/Chain and Weld Bead

#### **Representations of Assembly Components**

- a) Light Weight, Suppressed and Resolved
- b) Hide, Transparency and Isolate
- c) Exploded View

#### **Assembly Check**

- a) Interference Detection,
- b) Collision Detection and Physical Dynamics

#### **Motion Study**

- c) Assembly Motion & Physical Simulation
- d) Animation Wizard & Save as AVI file
- e) Mechanism Analysis – Plot Displacement, Velocity and Acceleration Diagram

#### **5 DETAILED DRAFTING**

##### **Introduction to Engineering Drawings**

- a) General Procedure for Drafting & Detailing
- b) Inserting Drawing Views, Dimensioning and Adding Annotations
- c) Drawing Templates & Sheet Format
- d) Setting Options

##### **Drawing Views**

- a) Model View & Standard 3 View
- b) Projected View & Auxiliary View
- c) Section & Aligned Section View
- d) Detail View, Broken-out Section and Crop View.

##### **Dimensioning**

- a) Standards, Rules and Guidelines
- b) Dimension Insertion/Creation - Insert Model Items & Dimension tool

##### **Annotations**

- a) Notes & Holes Callout
- b) Datum & Geometric Tolerances
- c) Surface Finish & Weld Symbols, Centre Mark & Centre line, BOM Balloon & Bill of Material

**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING (1<sup>st</sup> Sem.)  
(INDUSTRIAL & PRODUCTION ENGINEERING)**

MTAD-103A	DISASTER MANAGEMENT						
Lecture	Tutorial	Practical	Credits	Major Test	Minor Test	Total	Time (Hrs.)
2	0	0	-	-	100	100	3
<b>Objective</b>	The objective of this course is to impart the knowledge of disasters management.						
<b>Course Outcomes</b>							
<b>CO1</b>	To demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.						
<b>CO2</b>	To critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.						
<b>CO3</b>	To develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.						
<b>CO4</b>	To critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.						

**Unit-I**

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

**Unit-II**

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

**Unit-III**

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics.

Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data From Meteorological and other Agencies, Media Reports: Governmental and Community Preparedness.

**Unit-IV**

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

**RECOMMENDED BOOKS:**

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.
2. Sahni, Pardeep (Eds.), "Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., "Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.