MEDH/143/28/01/25

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
(Declared Under Distinct Category by Ministry of Education, Government of India)
NAAC Accredited with A++ Grade
Department of Mechanical Engineering

Dai 577
06/12/2025

(II SEM 2024 admitted batch)

Board of Studies Proceeding

Online Meeting Dated: 06/12/2024

Department of Mechanical Engineering

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
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Minutes of Board of Studies Meeting held on 06th December, 2024

The meeting of Board of Studies (BoS) of the Mechanical Engineering was held on 06th December, 2024 at 12:30 PM onwards in online mode. Following members were present

1. Dr . C. S. Malvi (Chairperson, BoS and Head, Dept. of Mech. Engg. MITS-DU)
2. Dr. B. B. Panigrahi (Professor, IIT, Hyderabad, External Expert)
3. Dr. Mukul Shukla (Professor, IIT, Hyderabad, External Expert)
4. Dr. Pratesh Jayaswal (Professor, Mechanical Engg. MITS, Member)
5. Dr. M. K. Gaur (Professor, Mechanical Engg. MITS, Member)
6. Dr. M. K. Sagar (Professor, Mechanical Engg. MITS, Member)
7. Prof. R. P. Kori (Astt. Prof., Mechanical Engg. MITS, Member)
8. Prof. V. Chaturvedi (Astt. Prof., Mechanical Engg. MITS, Member)
9. Dr. Jyoti Vimal (Astt. Prof., Mechanical Engg. MITS, Member)

Instructions for preparing BoS Proceedings

{All information is to be uploaded on the webpage under suitable heading (such as Board of Studies) and separate links to be provided for each category mentioned below}

Minutes should have a summary/cover page mentioning all the significant changes made in the following given format :

Courses where revision was carried out*							
(Course name)	Course Code	Year/Date of introduction	Year/Date of revision	Percentage of content added or replaced	Agenda Item No.	Page No.	Link of relevant documents/minutes
NIL							

New Courses added*					
(Course name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.	Link of relevant documents/minutes
NIL					

*** Separate page(s) for each of the above points; Agenda point wise minutes to be appended with each point and a separate link to be given in the appropriate column for each point**

BoS Agenda Items

ITME ME1

To confirm the minutes of previous BoS meeting held in the month of September 2024.

The minutes of the last BoS held on 12th September 2024 were confirmed. The BoS Minutes were presented & approved in Academic Council.

ITEM ME2

To review the scheme structure for the Batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) structure.

The proposed Scheme structure of B.Tech. II Semester Mechanical Engineering for the batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) offered was presented and discussed in the meeting.

S. No.	Course Code	Category Code	Course Name
1.	12241201	DC	Engineering Graphics
2.	12241202	DC	Engineering Thermodynamics
3.	12241203	DC	Engineering Mechanics
4.	12241204	DC	Metal Cutting & Machine Tools
5.	12241205	BSC	Matrix, Differential Equations and Vector Calculus
6.	12241206	DLC	Engineering Graphics Lab
7.	12241207	DLC	Problem Solving through Python Programming
8.	12241208	SP	Semester Proficiency$^{\$}$
9.	12241209	PBL	Micro Project-II$^{\#}$ (Metal Cutting & M/c Tools)
10.	12241210	ESC	Engineering Physics Lab$^{\$\$}$
11.	12241211	HSMC	Language Lab
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)
13.	SIP1XXXX	SIP	Skill Internship Program (Soft Skill)
14.	12241212	MAC	Sustainability & Environmental Science
15.	12241213	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration: Two Days)

ITEM ME3

To review and finalize the syllabi of all courses of **B. Tech. II Semester (for batch admitted in 2024-25)** under the flexible curriculum along with their COs.

The syllabi and Course outcomes for all the courses of B.Tech. Mechanical Engineering II Semester (for batch admitted 2024-25) were reviewed and finalized.

ITEM ME 4

To review and finalize the **Experiment list/ Lab manual and Micro Project-II** for all the Laboratory Courses to be offered in **B. Tech. II Semester (for batch admitted in 2024-25).**

The experimental list and list of micro project for B.Tech. Mechanical Engineering II Semester (for batch admitted 2024-25) were reviewed and finalized.

S.No.	Experiments (Expandable)
1.	Step Turning and Taper Turning on Lathe.
2.	Threads Cutting and Knurling on Lathe.
3.	Machining Flat Surface using Shaper Machine.
4.	Manufacturing of Spur Gear using Milling Machine.
5.	Making Internal Splines using Slotting Machine.
6.	Hole on work piece through Drilling.
7.	Grinding of Single Point Cutting Tool
8.	Slot / Groove cutting using shaping machine.

ITEM ME5	**To review and finalize the syllabi of II semester PG Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (M.E./M.Tech./MCA/MBA/MUP) along with their Course Outcomes (COs)** N/A
ITEM ME6	**To review and finalize the syllabus/module of Classified Novel Engaging Course to be offered in II semester of PG programme** The following course will be offered as classified Novel Engaging Course in I sem. PG Program 1. Research Management The syllabus/Module for this course was finalized and discussed in the Meeting.
ITEM ME7	**Any other Matter** N/A

Dr. Jyoti Vimal
(BoS Member)

Mr. V. Chaturvedi
(BoS Member)

Mr. R. P. Kori
(BoS Member)

Dr. M. K. Sagar
(BoS Member)

Dr. M. K. Gaur
(BoS Member)

Dr. Pratesh Jayaswal
(BoS Member)

Dr. Mukul Shukla
(External Expert)
online Present

Dr. B. B. Panigrahi
(External Expert)
online Present

Dr. C. S. Malvi
(BoS Chairman)

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Item ME2	To review the scheme structure for the Batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) structure.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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NAAC Accredited with A++ Grade

Department of Mechanical Engineering

Scheme of Evaluation

B. Tech. I Semester *(Mechanical Engineering)* ***(for batch admitted in academic session 2024-25)***

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	12241101	DC	Engineering Materials	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	12241102	ESC	Computer Programming	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
3.	12241103	DC	Manufacturing Science	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	12241104	DC	Basic Mechanical Engineering	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	12241105	ESC	Basic Electrical & Electronics Engineering	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
6.	12241106	DLC	Computer Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	12241107	DLC	Electrical & Electronics Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	12241108	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	12241109	PBL	Micro Project-I[#] (Manufacturing Science/Workshop)	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	12241110	ESC	Engineering Chemistry Lab[$$]	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
			Total	**100**	**100**	**150**	**150**	**380**	**120**	**1000**	**11**	**03**	**10**	**19**	-	-	-
12.	12241111	MAC	Universal Human Values & Professional Ethics (UHVPE)	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	12241112	MWS	Mandatory Workshop on Indian Constitution and Traditional Knowledge at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.																	
Skill Internship Program (Soft Skill): Minimum 45 hours duration: To be credited in II Semester.																	

[$] Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc in the semester courses

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

[$$] This course will be distributed in the I Year Group wise among the programmes where ever required

[#] Micro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee

ESC	DC	DLC	NEC	SP	PBL	MAC	MWS
3	7	2	1	1	1	1	1

Mode of Learning							Mode of Examination						
Theory		Proficiency	NEC	Lab			Theory				Lab		
Face to Face	Online	Face to Face	Interactive	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	
13	-	1	1	-	1	3	6	-	7	-	3	3	19
68.42%	-	5.26%	5.26%	-	5.26%	15.79%	31.58%	-	31.05%	-	15.79%	15.79%	Credits %

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Department of Mechanical Engineering

Scheme of Evaluation

B. Tech. II Semester *(Mechanical Engineering)* ***(for batch admitted in academic session 2024-25)***

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional									
1.	12241201	DC	Engineering Graphics	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
2.	12241202	DC	Engineering Thermodynamics	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	12241203	DC	Engineering Mechanics	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	12241204	DC	Metal Cutting & Machine Tools	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	12241205	BSC	Matrix, Differential Equations and Vector Calculus	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	12241206	DLC	Engineering Graphics Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	12241207	DLC	Problem Solving through Python Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	12241208	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	12241209	PBL	Micro Project-II[*] (Metal Cutting & M/c Tools)	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	12241210	ESC	Engineering Physics Lab[$$]	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	12241211	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	2	1	Blended	AO	-
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
13.	SIPXXXX	SIP	Skill Internship Program (Soft Skill)	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	-
Total				100	100	150	150	510	150	1160	11	05	12	24	-	-	-
14.	12241212	MAC	Sustainability & Environmental Science	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
15.	12241213	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-

Summer Semester of six-eight weeks duration will be conducted for makeup of I & II semester examination.

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc in the semester courses

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

[$$] This course will be distributed in the I Year Group wise among the programmes where ever required

** These credits will be transferred from Skill Internship Program (Soft Skill)

* Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee

HSMC	BSC	ESC	DC	DLC	NEC	SP	SIP	PBL	MAC	MWS
1	1	1	4	2	1	1	1	1	1	1

Mode of Learning							Mode of Examination						
Theory		Proficiency	NEC	Lab			Theory				Lab		Total Credits
Face to Face	Online	Face to Face	Interactive	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	
15	-	1	1	1	3	3	6	-	9	-	5	4	24
62.5%	-	4.17%	4.17%	4.17%	12.5%	12.5%	50%	-	37.5%	-	20.83%	29.17%	Credit %

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For batch admitted in Academic Session 2024-25

12241201: Engineering Graphics

Category	Title	Code	Credit-3			Major Evaluation
			L	T	P	Max.Marks-30 Duration-2 hrs.
Departmental Core-DC	Engineering Graphics	12241201	2	1	-	

Course Objective:

1. To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects.
2. To impart knowledge about principles/methods related to projections of one, two and three dimensional objects.

Syllabus:

Unit - 1

Scale and Spirals: Basics of instruments, Lettering and dimensioning, Plane geometrical constructions. Plain and diagonal scale - Representative fraction, Unit conversion and Exercises based on linear, area, volume, Archimedean and logarithmic spiral curves.

Unit - 2

Projection of points: Introduction, types of projections, quadrant system, positions of points and Exercise.

Projection of straight line: Introduction, Orientation of a straight line, Traces of a line and Exercise.

Unit - 3

Projection of planes: Introduction, Types of planes, Traces of planes, Position of planes and Exercise.

Projection of solids: Introduction, Types of solids, Positions of solids and Exercise.

Unit - 4

Section of solids: introduction, Types of section planes and Anti-section and Exercise.

Development of surfaces: Introduction, Methods of development of Prism, Pyramid, Cone, Cylinder.

Unit - 5

Isometric projections: Introduction, isometric scale, isometric axis, isometric view and isometric projections from orthographic views, orthographic views from pictorial view and exercise. **Computer Aided Drafting using Auto CAD:** Introduction, software's basic commands, transformation and editing commands.

Course Outcomes: After successful completion of this course students will be able to:

CO1. **Draw** plain, diagonal scale and spirals for given conditions.

CO2. **Analyse** and represent the positions of points and orientations of straight lines in different quadrants.

CO3. **Interpret** and represent the projections of planes and solids in various orientations.

CO4. **Create** sectional views of solids using appropriate section planes, including anti-sections, and apply various methods to develop the surfaces.

CO5. **Develop** the ability to create isometric projections and views of 3D objects using isometric scales and auto CAD.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	-	1	-	-	1	3	-	1
CO2	3	3	2	2	1	1	-	1	-	-	1	3	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	3	1	2
CO4	3	3	2	2	1	1	-	1	-	-	1	3	-	-
CO5	3	3	2	3	3	2	-	1	-	-	1	3	1	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Text books:

1. Engineering Drawing by N. D. Bhatt, Charotar Publication Pvt. Ltd.
2. Engineering Drawing by P.S. Gill, S. K. kataria& sons, Delhi
3. Engineering Drawing by BasantAgrawal& C. M. Agrawal, Tata McGraw Hill Education Pvt. Ltd.
4. Engineering Graphics by K. Venugopal, New Age International Publication, India

NPTEL Link for Engineering Graphics:

http://nptel.ac.in/courses/112103019/

12241202: Engineering Thermodynamics

Category	Title	Code	Credit-3			Theory Major Evaluation
			L	T	P	Max.Marks-30 Duration-2 hrs.
Departmental Core-DC	Engineering Thermodynamics	12241202	2	1	-	

Course Objective: To make students able to:

1. Understand the nature and role of the various thermodynamic properties of matter.
2. Represent a thermodynamic system by a control mass or control volume and identify work and/or heat interactions between the system and surroundings.
3. Recognize the different forms of energy and restrictions imposed by the laws of thermodynamics on conversion from one form to another.

Syllabus

Unit–I Basic Concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, Statement and significance, Concept of an Ideal gas, Gas Laws, Avogadro's Hypothesis, Heat and work transfer. First law of thermodynamics –Statement of first law of thermodynamics, first law applied to closed system undergoing a cycle, Process analysis of closed system flow process, Flow energy, Steady flow process analysis of closed system processes, Limitations of first law of thermodynamics.

Unit –II Properties of pure substances: - P-V-T surfaces, h-s, T-S, P-V, P-h, T-V diagrams of pure substance, saturated and sub-cooled liquid, superheated vapour, quality of steam, Mollier diagram, steam table, different processes, measurement of quality of steam

Unit –III Second law of thermodynamics: Heat engine, Heat reservoir, Refrigerator, Heat pump, COP, Carnot's theorem, Carnot's cycle, Efficiency of Carnot's cycle, Statement of second law, Reversible and Irreversible processes, Consequences of Second law.

Unit –IV Availability and Irreversibility: Entropy, Entropy changes of Ideal gas, Available energy, T-S diagram, Availability and Irreversibility.

Unit- V Thermodynamics Relations: Thermodynamics relations, e.g Maxwell relations and their applications.

Air Standard Cycles: Carnot, Sterling, Ericssion, Otto, Diesel, Dual cycles and determination of their air standard efficiencies and their comparison. Brayton cycle, Atkinson cycle. PVT relationship, Mixture of ideal gases Properties of mixture of gases.

Course Outcomes: After successful completion of this course students will be able to:

CO1: **Describe** the basic concepts of thermodynamics, including properties, equilibrium, state, process, and cycle, and explain their significance in analyzing thermal systems.

CO2: **Analyze** the thermodynamic properties of pure substances using P-V-T surfaces, Mollier charts, and steam tables.

CO3: **Analyze** the operation and performance of heat engines, refrigerators, and heat pumps, including their coefficients of performance (COP) and efficiencies.

CO4: **Apply** the concepts of availability and irreversibility to quantify the efficiency losses in practical thermodynamic systems.

CO5: **Analyze** the performance of Carnot, Stirling, Ericsson, Otto, Diesel, Dual, Brayton, and Atkinson cycles.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	-	-	1	1	-	1
CO2	3	3	3	3	2	1	1	1	-	-	1	1	1	1
CO3	3	3	3	3	2	2	2	1	-	-	1	1	1	2
CO4	3	3	3	3	1	1	1	1	-	-	1	1	-	-
CO5	3	3	3	3	3	2	2	1	-	-	1	1	1	2

1 - Slightly, 2 - Moderately, 3 – Substantially

Text &Reference Books:

1. Engineering thermodynamics by P.K. Nag
2. Thermal engineering by R.K. Rajput
3. Thermal engineering by P.L. Ballaney
4. P L Dhar Thermal Engineering

NPTEL Link for Engineering Thermodynamics

https://onlinecourses.nptel.ac.in/noc18_ch03/preview

12241203: Engineering Mechanics

Category	Title	Code	Credit-3			Theory Major Evaluation
			L	T	P	
Departmental Core-DC	Engineering Mechanics	12241203	2	1	-	Max.Marks-30 Duration-2 hrs.

Course Objective: To make students able to:

1. Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
2. Correlate real life application to specific type of friction and estimate required force to overcome friction.
3. Analyze particles in motion using force and acceleration, work-energy and impulse momentum principles

Syllabus

Unit–I Basic Concepts: Classification of force systems, Principle of transmissibility, composition and force system (Concurrent forces, parallel forces and non-concurrent Non-parallel system of forces). Parallelogram Law of Forces, Moment of force about a point, Couples, Varignon's Theorem.

Unit –II Equilibrium of System: Newton's Laws of motion, D'Alembert's principle. conservative and non-conservative forces, Conditions of equilibrium for concurrent forces, parallel forces and non-concurring non- parallel forces. Equilibrium of rigid bodies free body diagrams. Lami's Theorem

Unit –III Friction: Characteristics of Frictional Force Static Friction, Dynamic/ Kinetic Friction, Coefficient of Friction, Angle of Friction, Limiting Friction, Angle of repose, Laws of friction. Equilibrium of bodies on inclined plane. Application to ladders problems.

Unit –IV Structure Analysis : Types of beams, types of loading and supports and reaction: Determination of reactions at supports for various types of loads on beams. (Excluding problems on internal hinges) Shear force and bending moment, **Trusses:** Introduction, Simple Trusses, Determination of forces in simple trusses members, methods of joints and methods of section . Difference between trusses, frames and beams

Unit- V Work and Energy: Work, power, energy, Work Energy principle for a particle in motion. Application of Work – Energy principle **Impulse and Momentum:**. Impulse, Momentum. Coefficient of restitution, Impulse Momentum principle of particle Impact and collision: Law of conservation of momentum, Coefficient of Restitution

Course Outcomes: After successful completion of this course students will be able to:

CO1: **Describe** the fundamental principles of force systems, including the classification of force systems, principle of transmissibility, and the composition and resolution of forces.
CO2: **Illustrate** the conditions of equilibrium for various force systems, including concurrent, parallel, and non-concurrent non-parallel forces, as well as couples
CO3: **Solve** real-world problems involving ladders and other friction-dependent systems."
CO4:**Apply** the concepts of shear force and bending moment in practical systems and determine of reactions at supports for various types of loads.
CO5: **Analyze** the concepts of impulse and momentum, including their interrelation through the impulse-

momentum principle, and solve problems involving dynamic system

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	1	-	-	1	3	-	1
CO2	3	3	3	3	2	1	1	1	-	-	1	3	1	1
CO3	3	3	3	3	2	2	2	1	-	-	1	3	1	2
CO4	3	3	3	3	1	1	1	1	-	-	1	3	-	-
CO5	3	3	3	3	3	2	2	1	-	-	1	3	1	2

1-Slightly;2-Moderately;3–Substantially

Text &Reference Books:

5. Engineering Mechanics, by S.S. Bhavi Katti ,New Age Pub.
6. Engineering Mechanics, by R.K. Rajput, Laxmi Pub.
7. Mechanical Engineering by, S.K. Katarial & Sons
8. Engineering Mechanics by Beer &Johnston, Tata McGrawHill

NPTEL Link for Engineering Mechanics

https://archive.nptel.ac.in/courses/112/106/112106286/

12241204: Metal Cutting and Machine Tools

Category	Title	Code	Credit: 3			Theory Major Evaluation
Departmental Core-DC	Metal Cutting and Machine Tools	12241204	L	T	P	Max.Marks-30 Duration-2 hrs.
			2	1	-	

Course Objectives: To make the students understand:

1. The fundamental knowledge and principles in material removal processes.
2. The fundamentals and principles of metal cutting to practical applications through
3. The fundamentals of machining processes and machine tools.

Syllabus

Unit-I Mechanics of Metal Cutting: Introduction to manufacturing and machining, Classification of metal removal processes, Geometry of single point cutting tool and tool angles. Tool nomenclature. Conversion of tool angles from one system to another, Mechanics of chip formation and types of chips, chip breakers. Orthogonal and oblique cutting, cutting forces and power required, theories of metal cutting. Thermal aspects of machining and measurement of chip tool interface temperature. Friction in metal cutting. **Machinability & Cutting Fluids:** Concept and evaluation of machinability, tool life, mechanism of tool failure, tool life and cutting parameters, machinability index, factors affecting machinability. Advanced Cutting Tool Materials, Cutting Fluids

Unit-II General Purpose Machine Tool: Constructional detail of milling, shaper and planer machines. Tooling, attachments and operations performed, selection of cutting parameters, calculation of forces and time for machining. Broaching operation. Capston and turret Lathes, single and multiple spindle automates, operations, planning and tool layout.

Unit-III Abrasive Processes & surface Finishing: Abrasive, natural and synthetic, manufacturing nomenclature. Selection of grinding wheels, wheel mounting and dressing. **Surface Finish:** Elements of surface roughness, evaluation and representation and measurement of surface roughness, relationship of surface roughness to production methods.

Unit-IV Gear Manufacturing Processes: Introduction, materials, methods of gear manufacturing, Gear Milling, Gear Hobbing& Gear Shaping Machine Tools and processes. Modern gear manufacturing methods, gear inspection.

Unit-V Non-Conventional machining: Benefits, general application and survey of Non-conventional machining processes. Mechanism of metal removal, tooling and equipment and specific applications of EDM, LBM, EBM, ECM, USM, AJM, WJM, AWJM, PAM processes

Course Outcomes: After successful completion of this course students will be able to

CO1: **Apply** cutting mechanics to metal machining based on cutting force and power consumption.

CO2: **Differentiate** lathe, milling machines, drill press, grinding machines, etc. according to the operations.

CO3: **Analyze** abrasive processes, including grinding wheel selection and dressing, and evaluate surface roughness measurement techniques and their relationship to production methods.

CO4: **Describe** the materials and methods used in traditional and modern gear manufacturing processes.

CO5: Analyze the benefits, applications, and mechanisms of metal removal in non-conventional machining processes.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	3	1	1	1	2	1	-	3	1	1
CO2	3	1	2	2	3	1	1	1	1	1	-	3	1	1
CO3	3	3	3	2	3	2	1	1	1	1	2	3	1	2
CO4	3	3	3	2	3	1	2	1	1	1	2	3	1	2
CO5	3	3	3	3	3	2	1	1	1	1	2	3	1	2
CO6	3	3	3	3	3	3	2	3	1	2	2	3	1	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Text Books

1. Fundamentals of Metal Cutting and Machine Tool by Boothroyd Geofery; McGH, Kogakuha Ltd.
2. Production Technology by Jain, R.K. and Gupta, S.C; Khanna Publishers.

Reference Books:

1. Workshop Technology by Chapman, Volume I, II, & III, ELBS.
2. Production Technology by HMT; McGraw Hill, New Delhi.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Mechanical Engineering

For batch admitted in Academic Session 2024-25

12241206: Engineering Graphics Lab

Category	Title	Code	Credit-1			Practical Major Evaluation
			L	T	P	Max.Marks-30
Departmental Laboratory Course-DLC	Engineering Graphics Lab	12241206	-	-	2	

Laboratory Work

List of Experiments:

1. To prepare sheet of Plain scale, diagonal scale .
2. To prepare sheet of Projection of points and lines.
3. To prepare sheet of Projection of Planes.
4. To prepare sheet of Projection of Solids.
5. To prepare sheet of Section of Solids.
6. To prepare sheet of Development of Surfaces.
7. To prepare sheet of Isometric Projections.

Skill Based Projects:

1. To prepare the 3D view of any object.
2. To Prepare scale for your home and make a map using this scale.
3. To prepare cut section models drawing of any object.
4. To make paper object, cut and show the development of surfaces.
5. To prepare simple drawing using Auto CAD.

Course Outcomes: After successful completion of this course students will be able to:

CO1. **Draw** plain, diagonal scale and spirals for given conditions.

CO2. **Analyze** and represent the positions of points and orientations of straight lines in different quadrants.

CO3. **Interpret** and represent the projections of planes and solids in various orientations.

CO4. **Create** sectional views of solids using appropriate section planes, including anti-sections, and apply various methods to develop the surfaces.

CO5. **Develop** the ability to create isometric projections and views of 3D objects using isometric scales and Auto CAD.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	-	1	-	-	1	3	-	1
CO2	3	3	2	2	1	1	-	1	-	-	1	3	1	1
CO3	3	3	2	2	1	2	-	1	-	-	1	3	1	2
CO4	3	3	2	2	1	1	-	1	-	-	1	3	-	-
CO5	3	3	2	3	3	2	-	1	-	-	1	3	1	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Item ME4	**To review and finalize the Experiment list/ Lab manual and Micro Project-II for all the Laboratory Courses to be offered in B. Tech. II Semester (for batch admitted in 2024-25)**

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Scheme of Evaluation

12241209: Micro Project-II (Metal Cutting & M/c Tools)

Category	Title	Code	Credit-I			Practical paper
					P	Major Evaluation-30
Project Based Learning (PBL)	Micro Project-II (Metal Cutting & M/c Tools)	12241209	--	-	2	

Course Objectives:

1. To familiarize with the basics of tools and equipment used in Machine shops.
2. To Prepare the objects using different machine tools.
3. To develop general machining skills in the students.

List of Experiments:

1. Step Turning and Taper Turning on Lathe.
2. Threads Cutting and Knurling on Lathe.
3. Machining Flat Surface using Shaper Machine.
4. Manufacturing of Spur Gear using Milling Machine.
5. Making Internal Splines using Slotting Machine.
6. Hole on work piece through Drilling.
7. Grinding of Single Point Cutting Tool
8. Slot / Groove cutting using shaping machine.

Laboratory Course Outcomes: After the completion of the course Lab student will be able to:

CO1 **Define** the different conventional method of material removal and function of different parts.
CO2 **Apply** the theory of metal cutting in experiments.
CO3 **Perform** step, taper turning, knurling and threading.
CO4 **Produce** stepped surface using shaper and keyway using milling machine.
CO5 **Demonstrate** knowledge of different machine tools used in machine shop.
CO6 **Evaluate** the chip thickness ratio, shear angle and material removal rate.

Micro Projects (Expandable)

1. Make a Free energy Steam Engine at home
2. Make an Air Compressor at home
3. Mini Bench Tapping machine project
4. Make a Robotic Arm
5. Make a Hydraulic Lift
6. Thermal Expansion project
7. Make a positive displacement pump

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	3	1	1	1	3	2	3	3	1	1
CO2	3	1	2	2	3	1	1	1	3	2	3	3	1	1
CO3	3	3	3	2	3	2	1	1	3	2	3	3	1	2
CO4	3	3	3	2	3	1	2	1	3	1	3	3	1	2
CO5	3	3	3	3	3	2	1	1	3	1	2	3	1	2
CO6	3	3	3	3	3	3	2	3	3	2	2	3	1	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Item ME6	To review and finalize the syllabus/module of Classified Novel Engaging Course to be offered in I semester of PG programme.

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(Declared Under Distinct Category by Ministry of Education, Government of India)
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CNEC PROPOSAL (Dept. of Mechanical Engineering)

Name of Faculty Mentor	Dr. Amit Aherwar
Novel Engaging Course Title	Research Management
Objectives of Course	▪ To understand the importance of reference management ▪ To familiarize with reference management tools
Content	— Introduction to Reference Management — Reference Management Tools — Effective Research Strategies — Citation and Plagiarism Management — Advanced Reference Management Techniques — Applying Reference Management in Engineering Research
Contact Hours	15 Hrs
Mode of Delivery	Blended (online & Offline both)
Outcomes of Course	After completion of the course, students will be able to: ▪ Effectively use reference management tools ▪ Conduct and organize research efficiently ▪ Cite sources accurately and prevent plagiarism ▪ Integrate reference management with writing tools ▪ Adapt to emerging trends in reference management
External Mentors / Collaborations	Nil