

MEDH/143/28/01/25

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed to be University
(Declared under Distinct Category by Ministry of Education, Government of India)
NAAC ACCREDITED WITH A++ GRADE
Department of Mechanical Engineering

Dr. No 577

06/02/2025

BOARD OF STUDIES (BOS) PROCEEDING
(MEETING DATED 5th December 2024)

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MINUTES OF MEETING OF BOARD OF STUDIES (BoS)

An online meeting of following members (external and internal) was held on 5th December 2024 at 12:30 noon through online mode (Google Meet Link <https://meet.google.com/oia-qvod-gmv>).

Following members were present:

- | | | |
|------|-----------------------------|---|
| (1) | Dr. C. S. Malvi | Head of the Department and Chairman of the Committee |
| (2) | Dr. Prashant Kumar Jain | Professor, IIITDM, Jabalpur, RGPV Nominee |
| (3) | Dr. Mukul Shukla | Professor, MNNIT, Allahabad, AC Nominee |
| (4) | Er. Abhishek Khare | Aerodynamics Engineer Calidus, LLC, Abu Dhabi, Alumni |
| (5) | Dr. Pratesh Jayaswal | Member |
| (6) | Dr. Manish Ku. Sagar | Member |
| (7) | Dr. M. K. Gaur | Member |
| (8) | Mr. R. P. Kori | Member |
| (9) | Mr. Vedansh Chaturvedi | Member |
| (10) | Dr. Jyoti Vimal | Member |
| (11) | Mr. Sharad Agrawal | Member |
| (12) | Mr. Vaibhav Shivhare | Member |
| (13) | Dr. Amit Aherwar | Member |
| (14) | Mr. Bhupendra K Pandey | Member |
| (15) | Dr. Nitin Upadhyay | Member |
| (16) | Dr. Surendra Ku. Chourasiya | Member |
| (17) | Dr. Gavendra Norkey | Member |

Dept. of Mechanical Engg.

BoS-05/12/2024

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Agenda of the BoS Meeting

(BoS Meeting held on 5th December 2024)

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 format :

Courses where revision was carried out*							
(Course/subject 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/subject 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					

Feedback on curriculum received from stakeholders: Analysis & ATR*					
Stakeholder	Student	Faculty	Alumni	Employer	
No. of responses	198	8	30	68	
Link of Analysis	https://docs.google.com/spreadsheets/d/13o6xMCkAsEunTKYtufuRzbXisYk0Ec7E/edit?usp=drive_link&ouid=110499483831438724131&rfpof=true&sd=true	https://docs.google.com/spreadsheets/d/1KbX8aEbNCHskDE77n_WSeDrVstZBXl/edit?usp=drive_link&ouid=110499483831438724131&rfpof=true&sd=true	https://docs.google.com/spreadsheets/d/1TNaSjOhkR0I4b8xalNS7s0EaNuSYKP6/edit?usp=sharing&ouid=110499483831438724131&rfpof=true&sd=true	https://docs.google.com/spreadsheets/d/1BdtloTX_Md4-i_DnuQ-Wvv/C-mDEGzmO/edit?usp=drive_link&ouid=110499483831438724131&rfpof=true&sd=true	
ATR Link	https://drive.google.com/file/d/1nSS8bXB5TpUdY6luOm3UfG1T3P0vTWD/view?usp=drive_link	https://drive.google.com/file/d/1nSS8bXB5TpUdY6luOm3UfG1T3P0vTWD/view?usp=drive_link	https://drive.google.com/file/d/1nSS8bXB5TpUdY6luOm3UfG1T3P0vTWD/view?usp=drive_link	https://drive.google.com/file/d/1nSS8bXB5TpUdY6luOm3UfG1T3P0vTWD/view?usp=drive_link	
Link showing Excel sheet of Google Form details of stakeholders	https://docs.google.com/spreadsheets/d/13o6xMCkAsEunTKYtufuRzbXisYk0Ec7E/edit?usp=drive_link&ouid=110499483831438724131&rfpof=true&sd=true	https://docs.google.com/spreadsheets/d/1KbX8aEbNCHskDE77n_WSeDrVstZBXl/edit?usp=drive_link&ouid=110499483831438724131&rfpof=true&sd=true	https://docs.google.com/spreadsheets/d/1TNaSjOhkR0I4b8xalNS7s0EaNuSYKP6/edit?usp=sharing&ouid=110499483831438724131&rfpof=true&sd=true	https://docs.google.com/spreadsheets/d/1BdtloTX_Md4-i_DnuQ-Wvv/C-mDEGzmO/edit?usp=drive_link&ouid=110499483831438724131&rfpof=true&sd=true	

* Separate page(s) for each of the above four 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

Item ME1	To confirm the minutes of previous BoS meeting held in the month of May-June 2024. The minutes of the last BoS held on 30th may 2024 were confirmed. The BoS Minutes were presented & approved in Academic Council Meeting held on 11th June 2024.																																									
Item ME2	To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in academic year 2021-22. (The total credits from I-VIII semester should not be less than 160 for this batch). <table border="1"> <tr> <th>S.No.</th><th>Subject Code</th><th>Category</th><th>Subject Name</th><th></th><th></th></tr> <tr> <td>1.</td><td>DE*</td><td>DE</td><td>Departmental Elective (DE-5)</td><td></td><td></td></tr> <tr> <td>2.</td><td>OC*</td><td>OC</td><td>Open Category (OC-3)</td><td></td><td></td></tr> <tr> <td>3.</td><td>120811/190811</td><td>DLC</td><td>Internship/Research Project/ Innovation & Start-up</td><td></td><td></td></tr> <tr> <td>4.</td><td>120812/190812</td><td>PD</td><td>Professional Development</td><td></td><td></td></tr> </table> ITEM ME2.docx	S.No.	Subject Code	Category	Subject Name			1.	DE*	DE	Departmental Elective (DE-5)			2.	OC*	OC	Open Category (OC-3)			3.	120811/190811	DLC	Internship/Research Project/ Innovation & Start-up			4.	120812/190812	PD	Professional Development													
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Dept. of Mechanical Engg.

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Mem
ME4

To propose the list of "Additional Courses" which can be opted for getting an

- Honours (for students of the host department)
- Minor Specialization (for students of other departments)

[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the B.Tech. VIII semester students (for the batch admitted in 2021-22)] and for B.Tech. VI semester (for the batch admitted in 2022-23)]

Minor Specialization	Minor Specialization
VIII sem (for the Batch admitted in 2021-22)	VI sem (for the Batch admitted in 2022-23)
IC Engines and Gas Turbines (12 weeks)	Fundamentals of Combustion (12 weeks)
Mechanics of Machining (8 weeks)	Introduction to Mechanical Micro Machining (12 weeks)

2021 & 2022 admitted batch Tracks (Jan-June 2024)			
Sr No.	Design Track	Thermal Track	Production Track
	Honors (Jan.-June)	Honors (Jan.-June)	Honors (Jan.-June)
1	Design, Technology and Innovation (8 week)	Computational Fluid Dynamics for Incompressible Flow (12 Weeks)	Introduction To Mechanical Micro Machining (8 weeks)
2	Introduction to Reliability Engineering (8 Weeks)	Turbulent Combustion: Theory And Modeling (12 weeks)	Product Design and Manufacturing (12 weeks)
3	Design Practices for Intelligent Manufacturing (8 Weeks)	Advanced Measurement Techniques in Fluid mechanics and Heat Transfer (12 Weeks)	Computer Integrated Manufacturing (12 Weeks)
4	Modeling and Simulation of Dynamic Systems (8 Weeks)	Heat Transfer and Combustion in Multiphase Systems (8 Weeks)	Welding Metallurgy (12 Weeks)

ITEM ME4.docx

Item
ME5

To review and finalize the scheme structure of B.Tech VI Semester under the flexible curriculum (Batch admitted in 2022-23)

Mechanical Engineering				Automobile Engineering		
S.No.	Subject Code	Category	Subject Name	Subject Code	Category	Subject Name
1.	2120611	DC	Refrigeration and Air-Conditioning (DC-13)	2190611	DC	Automotive Transmission (DC-13)
2.	DE	DE	Departmental Elective (DE-1)	DE	DE	Departmental Elective (DE-1)
3.	OC	OC	Open Category (OC-1)	OC	OC	Open Category (OC-1)
4.	2120612	MC	Artificial Intelligence & Machine Learning	2190612	MC	Artificial Intelligence & Machine Learning
5.	2120613	DLC	Minor Project-II	2190613	DLC	Minor Project-II
6.	200XXX	CLC	Novel Engaging Course (Informal Learning)	200XXX	CLC	Novel Engaging Course (Informal Learning)
7.	1000007	MAC	Intellectual Property Rights (IPR)	1000007	MAC	Intellectual Property Rights (IPR)

ITEM ME5.docx

Dept. of Mechanical Engg.

BoS-05/12/2024



Item ME6	To review & finalize the syllabi for all Departmental Core Courses (DC) of B. Tech VI Semester (for batch admitted in 2022-23) under the flexible curriculum along with their COs.																
	Mechanical Engineering			Automobile Engineering													
	S.No.	Subject Code	Category	Subject Name & Title	Subject Code	Category	Subject Name										
	1.	2120611	DC	Refrigeration and Air-conditioning	2190611	DC	Automotive Transmission										
<u>ITEM ME6.docx</u>																	
Item ME7	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered for batches admitted in 2022-23 in online mode under Departmental Elective (DE) Course with credit transfer, in the VI Semester.																
	Automobile Engineering			Mechanical Engineering													
	S.No.	Subject Code	Category	Subject Name & Title	Subject Code	Category	Subject Name										
	1.	2190661	DE	Fundamentals of Automotive Systems	2120661	DE	Fundamental of Welding Science and Technology										
	2.	2190662	DE	Viscous Fluid Flow	2120662	DE	Viscous Fluid Flow										
3.				2120663	DE	Properties of Materials (Nature and Properties of Material: III)											
<u>ITEM ME7.docx</u>																	
Item ME8	To review and finalize the courses & syllabi to be offered (for batch admitted in 2022-23) under the Open Category (OC) Courses to be offered in traditional mode for B Tech VI semester of other departments along with their COs.																
	<table border="1"> <tr> <th colspan="2">Open Category (OC1)</th> </tr> <tr> <th colspan="2">Mechanical Engg. Dept.</th> </tr> <tr> <th>Subject Code</th> <th>Subject Name</th> </tr> <tr> <td>910129</td> <td>Concepts of Mechanical Systems</td> </tr> <tr> <td>910130</td> <td>Digital Manufacturing</td> </tr> <tr> <td>910131</td> <td>Process Planning and Cost Estimation</td> </tr> </table>						Open Category (OC1)		Mechanical Engg. Dept.		Subject Code	Subject Name	910129	Concepts of Mechanical Systems	910130	Digital Manufacturing	910131
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910131	Process Planning and Cost Estimation																
<u>ITEM ME8.docx</u>																	



Item ME9	To review and finalize the Experiment list/ Lab manual/Skill based mini-project for all the Laboratory Courses to be offered in B.Tech.VI semester (for batch admitted in 2022-23).																																															
	<table border="1"> <thead> <tr> <th colspan="3">Mechanical/Automobile Engg. VI Sem</th> </tr> <tr> <th>S.No.</th> <th>Subject Code</th> <th>Subject Name</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2120611</td> <td>Refrigeration and Air-conditioning</td> </tr> <tr> <td>2</td> <td>2190611</td> <td>Automotive Transmission</td> </tr> </tbody> </table>				Mechanical/Automobile Engg. VI Sem			S.No.	Subject Code	Subject Name	1	2120611	Refrigeration and Air-conditioning	2	2190611	Automotive Transmission																																
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2120611: Refrigeration and Air-conditioning 1. Solar milk warmer cum cooler by vapour compression cycle refrigeration system. 2. Air purification using Electrostatic plate and coupled with Dehumidifier. 3. Air conditioning system by vehicle suspensor. 4. Heat dissipation in cars using thermo electric Refrigeration. 5. Solar Peltier Air Conditioner / Refrigerator. 6. Solar powered Electrolux Refrigeration System. 7. Water cooler cum Water Heater by using Refrigeration System. 8. Electrical Power Generation and Refrigeration by using waste heat from IC Engine. 9. Bicycle powered Refrigerator. 10. Air preheating System using condenser waste heat in Automobile.		2190611: Automotive Transmission 1. Sterling Engine Helicopter. 2. EL-bow mechanism – Gearless Transmission System. 3. Miniature Shiftless Transmission. 4. Wireless Power Transmission via Solar Power Satellite. 5. Fabrication of Solar railway track crack detecting vehicle. 6. Fabrication of Automatic Vehicle Over speed controlling system for School Zone. 7. Over speed indication and Automatic accident Avoiding System for four-wheeler. 8. Button operated electro- magnetic gear shifting system for two-wheeler. 9. Highways High Speed Sensing and Automatic Speed Braking System. 10. Automatic temperature controller with cooling system for car.																																														
ITEM ME9.docx																																																
Item ME10	To review and finalize the scheme structure of B. Tech. IV Semester under the flexible curriculum (for batch admitted in 2023-24).																																															
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ITEM ME11.docx

To review and finalize the Experiment list/ Lab manual/Skill based mini-project for all the Laboratory Courses to be offered in Batch IV semester (for batch admitted in 2022-23).

3120412: Design of Machine Elements	3120415: Production Lab	3120413: Dynamics of Machines
1. Design and drawing of Single, double and triple riveted joint 2. Design and drawing of Single and double strap butt joint 3. Design and drawing of Welded joint 4. Design and drawing of Socket and Spigot cotter joint 5. Design and drawing of Gib and Cotter joint. 6. Design and drawing of Knuckle joint 7. Study of Theories of failure 8. Design and drawing of Solid and hollow shaft 9. Design and drawing of Rigid coupling 10. Design and drawing of Flexible coupling	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	1. Study of various types of gears. 2. Study of various types of gear trains. 3. Balancing of rotating masses. 4. Balancing of reciprocating masses. 5. Study of kinematic synthesis of mechanisms. 6. Study of cams and followers. 7. To draw cam profile, velocity and acceleration diagrams of a given cam-follower mechanism. 8. Draw the profile of various cams with different types of followers. 9. Plot the follower displacement vs angle of cam rotation curves for changing compression spring, follower weights and cam speed. 10. Calculate the epicyclic gear ratio, input torque, holding torque and output torque.

Item
ME12

Skill Based Mini Projects

3120412: Design of Machine Elements	3120415: Production Lab	3120413: Dynamics of Machines
1. FEA of lap joint based on various geometrical parameters to study the behaviour of weld strength 2. Simulation of welding to study residual stress and distortions 3. Analysis of composite multi leaf spring using ANSYS 2020 R1 4. Heat Transfer analysis for different materials of ball bearing using ANSYS 2020 R1 5. Numerical analysis of Modified tooth in Spur Gear for increasing the performance by reducing the assembly errors and gear slippage in the axial direction during dynamic loading.	1. Slot / Groove cutting using shaping machine. 2. Performance on mold making of Simple component. 3. Performance on pattern making of Simple component. 4. Performance on Metal Casting of Simple component. 5. Performance on Welding of simple work piece (Example Arc Welding) 6. Performance on Sheet Metal work of Simple component. 7. Performance on hot forging of Simple component	1. Investigation of gyroscopic couple for self-balancing vehicle 2. Development of various toy mechanism. 3. Design of easy (make/use) cycle. 4. Working model of epicyclic gear train.

ITEM ME12.docx

To finalize the Skill Internship Project (SIP) module to be offered in Dec 2024.

S.No.	Name of Module	Name of Faculty
1	Hands on practice on conventional machining	Dr. S K Chourasiya
2	Introduction to AUTO CAD for Engineering Applications	Prof. Sharad Agrawal
3	Hands on practice on Casting Technology	Dr. Gavendra Norkey
4	Hands on practice on Welding Technology	Prof. R P Kori
5	Precision Machining and Metrology Workshop	Prof. Vaibhav Shivhare

ITEM ME13.docx

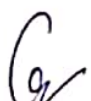
Item
ME13

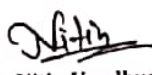
Dept. of Mechanical Engg.

BoS-05/12/2024



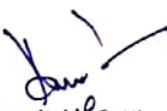
Item ME14	To propose the content of the courses identified for MITS-MOOC development to be offered in blended mode for VII Semester DE/OC courses for the batch admitted in 2022-23.			
	S.No.	Name of Course	Name of Faculty	DE/OC
	1	Solar Energy	Dr. C. S. Malvi	OC
	2	Total Quality Management	Prof. Sharad Agrawal	DE
	3	Metrology Measurement and Control	Dr. S. Chourasiya	DE
	4	Maintenance Engineering	Dr. G. Norkey	OC
Item ME15	To review the CO attainments, identify gaps and suggest corrective measures for the improvement in the CO attainment levels for the courses taught in Jan-June 2024 Session. Compiled			
Item ME16	To review the PO attainment, CO-PO mapping matrix and action to be taken to improve PO attainment level. Compiled			
Item ME17	To review curricula feedback from various stakeholders, its analysis and impact Compiled			
Item ME18	To discuss and recommend the scheme structure & syllabi of PG Programme (M.E./M.Tech./MCA/MBA) along with their COs (for batch admitted in 2023-24). N/A			
Item ME19	Any other matter.			

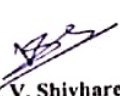

Dr. Gavendra Norkey
(BoS Member)


Dr. Nitin Upadhyay
(BoS Member)

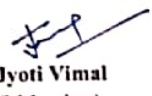

Dr. Surendra Ku.
Chourasiya
(BoS Member)

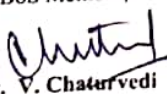

Mr. B. K. Pandey
(BoS Member)

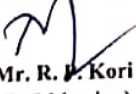

Dr. Amit Ahirwar
(BoS Member)

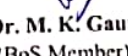

Mr. V. Shivhare
(BoS Member)


Mr. Sharad Agrawal
(BoS Member)

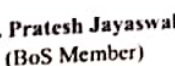

Dr. Jyoti Vimal
(BoS Member)

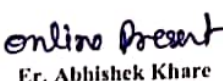

Mr. V. Chaturvedi
(BoS Member)

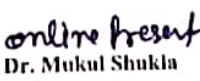

Mr. R. K. Kori
(BoS Member)

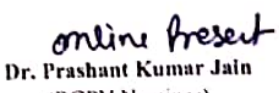

Dr. M. K. Gaur
(BoS Member)


Dr. M. K. Sagar
(BoS Member)

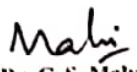

Dr. Pratesh Jayaswal
(BoS Member)


Er. Abhishek Khare
(Alumni)


Dr. Mukul Shukla
(AC Nominee)


Dr. Prashant Kumar Jain
(RGPV Nominee)


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Dr. C. S. Malvi
(BoS Chairman)



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Item ME2	To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in academic year 2021-22. (The total credits from I-VIII semester should not be less than 160 for this batch).
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D. no 513

30/12/2024



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Department of Mechanical Engineering
Scheme of Evaluation

B. Tech. VIII Semester (Mechanical Engineering)

S. No.			Subject Category Code	Subject Name	Maximum Marks Allotted										(for batch admitted in academic session 2021-22)					
					Theory Slot			Practical Slot			MOOCs		Total Marks	Contact Hours per week			Total Credits Teaching (Online, Offline, Blended)	Mode of Exam.		
					End Term Evaluation	Continuous Evaluation		End Sem. Exam.	Continuous Evaluation		Assignment	Exam								
						Proficiency Sem. in subject Exam.	Mid Sem. Exam.		Quiz/ Assignment	Lab work & Sessional				Skill Based Mini Project						
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	-	25	75	100	3	-	3	Blended	MCQ		
2.	OC	OC	Open Category* (OC-3)	-	-	-	-	-	-	-	25	75	100	3	-	3	Blended	MCQ		
3.	120811	DLC	Internship/Research Project/Innovation & Start-up	-	-	-	-	250	150	-	-	-	400	-	-	18	9	Blended	SO	
4.	120812	PD	Professional Development*	-	-	-	-	50	-	-	-	-	50	-	-	4	2	-	-	
Total					-	-	-	-	300	150	-	50	150	650	6	-	22	17	-	-
Additional Course for Honours or minor Specialization					Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization															
MICQ: Multiple Choice Question					AO: Assignment + Oral					PP: Pen Paper					SO: Subjective					

Additional Course for Honours or minor Specialization

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral
All of these courses will run through SWAYAM/NPTEL/ MOOC with credit transfer
Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities cultural events, sports, personality development activities, collaborative events MOOCs technical events institute department)

S.No.	*DE-5 (SWAYAM/NPTEL/ MOOC platform)	*Open Category (OC-3) (SWAYAM/NPTEL/ MOOC platform)
1	120861 Quality Design and Control	(For students of other branches) Theory and Practice of Non-Destructive Testing
2	120862 Robotics Basics and Selected Advanced Concepts	Product Design and Manufacturing
3	120863 Carbon Materials and Manufacturing	Automatic Control

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Department of Mechanical Engineering

B. Tech. VIII Semester (Automobile Engineering)

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted											Total Marks	Contact Hours per week			Mode of Teaching (Online, Offline, Blended)	Mode of Exam.
				Theory Slot					Practical Slot			MOOCs								
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation		Assignment		Exam							
				End Proficiency Sem. in subject Exam. /course	Mid Sem. Exam.	Quiz/ Assignment	Lab work & Sessional	Skill Based Mini Project												
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Blended	MCQ	
2.	OC	OC	Open Category* (OC-3)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Blended	MCQ	
3.	190811	DLC	Internship/Research Project/Innovation & Start-up	-	-	-	-	250	150	-	-	-	400	-	-	18	9	Blended	SO	
4.	190812	PD	Professional Development*	-	-	-	-	50	-	-	-	-	50	-	-	4	2	-	-	
Total				-	-	-	-	300	150	-	-	50	150	650	6	-	22	17	-	-
Additional Course for Honours or minor Specialization				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization																
MCO: Multiple Choice Question																				

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral

*All of these courses will run through SWAYAM/NPTEL/ MOOC with credit transfer

Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs, technical events, institute/departments)

S.No.	*DE-5 (SWAYAM/NPTEL/ MOOC platform)	*Open Category (OC-3) (SWAYAM/NPTEL/ MOOC platform)
1	190861 Fundamentals of Theoretical and Experimental Aerodynamics	Theory and Practice of other branches
2	190862 Experimental Stress Analysis	Product Design and Manufacturing
		Automatic Control







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Item ME3	To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in online mode under Departmental Elective (DE) category courses (DE-5) and open category (OC3) for credit transfer in the VIII Semester under the flexible curriculum (Batch admitted in academic year 2021-22).
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Department of Mechanical Engineering



B. Tech. VIII Semester (Mechanical Engineering)

S.No.	*DE-5 (SWAYAM/NPTEL/ MOOC platform)	Open Category (OC-3) (SWAYAM/NPTEL/ MOOC platform) (For students of other branches)
1	120861 Quality Design and Control	Theory and Practice of Non-Destructive Testing
2	120862 Robotics: Basics and Selected Advanced Concepts	Product Design and Manufacturing
3	120863 Carbon Materials and Manufacturing	Automatic Control

B. Tech. VIII Semester (Automobile Engineering)

S.No.	*DE-5 (SWAYAM/NPTEL/ MOOC platform)	Open Category (OC-3) (SWAYAM/NPTEL/ MOOC platform) (For students of other branches)
1	190861 Fundamentals of Theoretical and Experimental Aerodynamics	Theory and Practice of Non-Destructive Testing
2	190862 Experimental Stress Analysis	Product Design and Manufacturing
		Automatic Control

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Honors list (For Mechanical/Automobile Engg. VI & VIII Sem Students)

Item ME4	To propose the list of "Additional Courses" which can be opted for getting an Honours (for students of the host department) Minor Specialization (for students of other departments) [These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the B.Tech. VIII semester students (for the batch admitted in 2021-22)] and for B.Tech. VI semester (for the batch admitted in 2022-23)]
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Minor Specialization	Minor Specialization
VIII (for the Batch admitted in 2021-22)	VI (for the Batch admitted in 2022-23)
IC Engines and Gas Turbines (12 weeks)	Fundamentals of Combustion (12 weeks)
Mechanics of Machining (8 weeks)	Introduction to Mechanical Micro Machining (12 weeks)



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Scheme of Evaluation

Item ME5	To review and finalize the scheme structure of B.Tech VI Semester under the flexible curriculum (Batch admitted in 2022-23)
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Scheme of Evaluation
B. Tech. VI Semester (Mechanical Engineering)

(Batch admitted in 2022-23)

B. Tech. VI Semester (Mechanical Engineering)																					
			(Batch admitted in 2022-23)																		
S. No.	Subject Code	Subject Name	Maximum Marks Allotted										Contact Hours /week			Mode of Teaching	Mode of Exam.	Duration of Exam			
			Theory Slot			Practical Slot			MOOCs		Total Marks										
			End Term Evaluation	Continuous Evaluation		End Sem. Exam.	Lab work & Sessional	Skill Based Mini Project	Assignment	Exam											
			End Sem. Exam	Proficiency in subject /course	Mid Sem Exam	Quiz/Assign ment								L	T				P		
1.	2120611	Refrigeration and Air-Conditioning	50	10	20	20	20	60	20	20	-	-	200	3	-	2	4	PP	2 Hrs		
2.	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	-	-	-	25	75	100	3	-	-	3	MCQ	3 Hrs	
3.	OC	Open Category (OC-1)	50	10	20	20	20	-	-	-	-	-	-	100	3	-	-	3	Blended	2 Hrs	
4.	2120612	Artificial Intelligence & Machine Learning	50	10	20	20	20	60	20	20	20	-	-	200	2	1	2	4	Blended	1.5 Hrs	
5.	2120613	Minor Project-II**	-	-	-	-	60	60	40	-	-	-	-	100	-	-	6	3	Offline	SO	
6.	200XXXX	Novel Engaging Course (Informal Learning)	-	-	-	-	50	50	-	-	-	-	-	50	-	-	2	1	Interactive	SO	
7.	NSS	*Natural Sciences & Skills	200	40	80	80	120	40	40	40	-	-	-	600	1	-	2	2*	-	-	
Total			350	70	140	140	350	120	80	25	75	1350	12	1	12	20	-	-	-	-	
8.	1000007	Intellectual Property Rights (IPR)	50	10	20	20	-	-	-	-	-	-	-	100	2	-	-	Grade	Online	MCQ	1.5 Hrs
Additional Course for Honours or minor Specialization															Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester						
*Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Sciences / Languages															Permitted to opt for maximum two additional courses for the award of Honours or Minor specialisation						

Additional Course for Honours or minor Specialization
Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

*Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Science/ Language
(**Natural Sciences & Skills** treated as Mandatory Audit Courses from first to fourth semester and cumulative marks converted as a cluster of credits and awarded in the VI semester)

Proficiency in course/subject includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.
MCQ: Multiple Choice Question
SSAO: Assignment + Oral
SSPP: Pen Paper
SSSO: Submission + Oral

Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform with credit transfer

The minor project-II may be evaluated by an internal committee for awarding sessional marks.

S. No.	Code	Subject	**Open Category (OC-1) (For students of other branches)
1	2120661	Fundamental of Welding Science and Technology	Concepts of Mechanical Systems
2	2120662	Viscous Fluid Flow	Digital Manufacturing
3	2120663	Properties of Materials (Nature and Properties of Material III)	Process Planning and Cost Estimation

Mode of Teaching				Mode of Evaluation			
Online	Offline	Blended	Lab	Office	MCQ	Lab	PIP
2	3	14	1	10	7	SO	SO
11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9
20	20	20	20	20	20	20	20

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Scheme of Evaluation

B. Tech. VI Semester (Automobile Engineering)

(Batch admitted in 2022-23)

B. Tech. VI Semester (Automobile Engineering)																				
(Batch admitted in 2022-23)																				
S. No	Subject Code	Category Code	Subject Name	Maximum Marks Allotted																
				Theory Slot			Practical Slot			MOOCs		Contact Hours /week		Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam			
				End Term Evaluation	Continuous Evaluation		End Sem. Exam.	Lab work & Sessional	Skill Based Mini Project	Assignment	Exam									
				End Sem Exam.	Proficiency in subject /course	Mid Sem. Exam	Quiz/ Assignment						L	T	P					
1.	2190611	DC	Automotive Transmission	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Blended	PP	2 Hrs
2.	DE	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	OC	OC	Open Category (OC-1)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
4.	2190612	MC	Artificial Intelligence & Machine Learning	50	10	20	20	60	20	20	-	-	200	2	1	2	4	Blended	MCQ	1.5 Hrs
5.	2190613	DLC	Minor Project-II**	-	-	-	-	60	40	-	-	-	100	-	-	6	3	Offline	SO	
6.	208xxxx	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	50	-	-	2	1	Interactive	SO	
7.	NSS	NSS	*Natural Sciences & Skills	200	40	80	80	120	40	40	-	-	600	1	-	2	2*	-	-	-
8.	1600007	M&C	Intellectual Property Rights (IPR)	350	70	140	140	350	120	80	25	75	1350	12	1	12	20	-	-	-
				50	10	20	20	-	-	-	-	-	100	2	-	-	Grade	Online	MCQ	1.5 Hrs
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester ²																				
Permitted to opt for maximum two additional courses for the award of Honours or Minor specializations																				
Additional Course for Honours or minor Specialization																				
*Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Science / Engineering Mathematics / Engineering Graphics / Engineering Drawing / Engineering Design / Engineering Entrepreneurship / Engineering Innovation / Engineering Creativity / Engineering Problem Solving / Engineering Communication / Engineering Leadership / Engineering Teamwork / Engineering Ethics / Engineering Safety / Engineering Quality / Engineering Sustainability / Engineering Social Responsibility / Engineering Globalization / Engineering Internationalization / Engineering Digitalization / Engineering Automation / Engineering Robotics / Engineering Nanotechnology / Engineering Biotechnology / Engineering Materials / Engineering Manufacturing / Engineering Construction / Engineering Infrastructure / Engineering Transportation / Engineering Energy / Engineering Environment / Engineering Health / Engineering Agriculture / Engineering Forestry / Engineering Fisheries / Engineering Aquaculture / Engineering Food / Engineering Nutrition / Engineering Food Safety / Engineering Food Quality / Engineering Food Security / Engineering Food Sovereignty / Engineering Food Systems / Engineering Food Policy / Engineering Food Law / Engineering Food Governance / Engineering Food Justice / Engineering Food Equity / Engineering Food Access / Engineering Food Availability / Engineering Food Affordability / Engineering Food Desirability / Engineering Food Safety / Engineering Food Quality / Engineering Food Security / Engineering Food Sovereignty / Engineering Food Systems / Engineering Food Policy / Engineering Food Law / Engineering Food Governance / Engineering Food Justice / Engineering Food Equity / Engineering Food Access / Engineering Food Availability / Engineering Food Affordability / Engineering Food Desirability																				

Additional Course for Honours or minor Specialization

*Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Science/ Language

**Open Category (OC-1) (For students of other branches)

***Open Category (OC-1) (For students of other branches)

****Open Category (OC-1) (For students of other branches)

*****Open Category (OC-1) (For students of other branches)

*****Open Category (OC-1) (For students of other branches)

S.No.	Code	Subject	Code	Subject
1.	2190661	Fundamentals of Automotive Systems		
2.	2190662	Viscous Fluid Flow		
3.				

Theory		Lab		SIP		Theory		Lab		SIP	
Online	Offline	Online	Offline	Interactive	PP	A+D	MCQ	SO	SO	SO	SO
2	3	3	3	0	10	0	7	3	3	0	0
14.2	14.4	14.4	14.4	0	14.4	0	14.4	14.4	14.4	0	0
28	28	28	28	0	28	0	28	28	28	0	0
100	100	100	100	0	100	0	100	100	100	0	0

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Department of Mechanical Engineering

For batch admitted in Academic Session 2022-23



Item ME6	To review & finalize the syllabi for all Departmental Core Courses (DC) of B. Tech VI Semester (for batch admitted in 2022-23) under the flexible curriculum along with their COs.
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2120611: Refrigeration and Air-conditioning

Category	Title	Code	Credit-4			Theory Paper
Departmental Core -DC	Refrigeration and Air-conditioning	2120611	L	T	P	Max.Marks-50 Duration-2 hrs
			3	-	2	

Course Objectives: To make the students to understand

1. The fundamental principles and different methods of refrigeration and air conditioning.

2. Different refrigerants with respect to properties, applications and environmental issues.

3. The various equipment, operating principles, operating and safety controls employed in refrigeration air conditioning systems.

Pre-requisite: Engineering Thermodynamics

Syllabus

Unit I: Introduction to Refrigeration: –Basic Definition, ASHRAE Nomenclature, Air Refrigeration: Air Refrigeration Cycles-reversed Carnot cycle, Bell-Coleman cycle analysis, Air Refrigeration systems-merits and demerits, analysis.

Unit II: Vapour Compression Refrigeration System (VCRS): Carnot Vapour compression refrigeration cycle, Working and analysis, Limitations, Standard Vapour Compression Refrigeration system, Working and analysis, Effects of sub cooling and super heating, Multi-Pressure or Compound Vapour Compression Refrigeration Systems, Flash Gas removal, Flash inter cooling and water inter cooling.
Refrigerants: Classification, Selection of Refrigerants and Nomenclature of refrigerants, Desirable Properties of an ideal refrigerant, A discussion on Ozone layer Depletion and Global Warming.

Unit III: Vapour Absorption Systems: Absorbent – Refrigerant combinations, Water-Ammonia Systems, Water Lithium Bromide System, Contrast between the two systems, Modified Version of Aqua-Ammonia Brief Discussion on (i) Steam-Jet refrigeration system and (ii) Thermoelectric refrigeration system
Refrigeration System Equipment – Compressors, Condensers, Expansion Devices and Evaporators, System with Rectifier and Analyser Assembly

Unit IV: Psychrometry: Introduction to Air-Conditioning, Basic Definition, Classification, ASHRAE Nomenclature pertaining to Air-Conditioning, Applications of Air-Conditioning, Psychrometry –Air-water vapour mixtures, Psychrometric Properties, Psychrometric or Air-Conditioning processes, Psychrometric Chart.

Unit V: Air-Conditioning: Mathematical Analysis of Air-Conditioning Loads, Related Aspects, Numerical Problems, Different Air-Conditioning Systems-Central – Station Air-Conditioning System, Unitary Air-Conditioning System, Window Air-Conditioner and Packaged Air-Conditioner, Components related to Air-Conditioning Systems

Course outcomes: After the successful completion of this course, the student will be able to:

1. Identify components and processes involved in air refrigeration cycles
2. Analyze the working principles and limitations of standard Vapour Compression Refrigeration systems.
3. Evaluate the performance of different refrigeration system equipment like compressors, condensers, etc.
4. Interpret psychrometric properties and processes using psychrometric charts.

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5. Develop strategies for optimizing air-conditioning systems based on specific requirements and conditions.

List of Experiments (Expandable):

1. Demonstration of fundamental study of Absorption Refrigeration System.
2. To study Performance of Ice-Candy unit.
3. Demonstration of C.O.P. and Performance of Air-Conditioner.
4. Demonstration of fundamental study of Vapour Compression cycle (Ice candy Unit)
5. Determination of C.O.P. in Vapour compression Refrigeration system.
6. Demonstration of Electrolux Refrigerator.
7. Equipment and controls of Refrigeration Systems.
8. Equipment and controls of Air Conditioning Systems
9. To study duct and induct type AC
10. To study refrigeration and fault simulator
11. Demonstration of C.O.P. and other performance parameters for Mech. Heat Pump.
12. Demonstration of C.O.P. and other performance parameters for Mech. Heat Pump.

Text Books:

1. Arora C.P., Refrigeration and Air-conditioning, Tata McGraw -Hill Latest Edition, New Delhi

References Books :

1. Roy J. Dossat, Principles of Refrigeration, Wiley Limited
2. Stoecker W.F., and Jones J.W., Refrigeration and Air-conditioning, McGraw - Hill, New Delhi

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2190611: Automotive Transmission

Category	Title	Code	Credit-4			Theory Paper
			L	T	P	Max.Marks-50 Duration-2 hrs.
Departmental Core-DC	Automotive Transmission	2190611	3	-	2	

Course Objectives

To make the students:

1. develop the basic knowledge of the students in mechanics, torque conversion areas.
2. understand various transmission system.
3. develop the skills to work in the areas of alternative drives.

Syllabus

UNIT -I TRANSMISSION REQUIREMENTS:

Requirements of transmission system, general arrangement of power transmission, general arrangement of rear-engine vehicle with live axles, general arrangement of dead- axle and axles transmission; four-wheel-drive transmission.

UNIT -II CLUTCHES:

Clutches Requirements of clutches, principle of friction clutches, types of clutches and materials used- cone, single-plate, diaphragm-spring, multi-plate, centrifugal, over-running and electromagnetic clutch.

UNIT -III GEAR BOX:

Need of gear boxes, types- sliding mesh, constant mesh and epicyclic, gear boxes;

Synchronizers: principle, early and later Warner synchronizer, Vauxhall synchronizer- gear materials lubrication and design of gear box; Hydrodynamic drive: Advantages and limitations, principle of fluid coupling, constructional details, torque-capacity performance characteristics, drag torque, methods of minimizing drag torque; Torque converter: performance characteristics; single, multistage and poly phase torque converters, converter-coupling-performance characteristics, coupling-blade angle and fluid flow, converter fluid.

UNIT-IV TRANSMISSION SYSTEMS-DRIVE LINE:

Definition, forces & torques acting; types of drives-Hotchkiss, torque tube & radius rod drives; components- propeller shaft, slip joint, universal joints & constant velocity universal joints; front wheel drive; Final drive: definition; types- worm-wheel, straight-bevel gear, spiral-bevel gear & hypoid-gear drives; double-reduction & twin-speed final drives; Differential: Function, principle, construction and working; non-slip differential; differential lock; rear axle- loads acting & types; multi-axled vehicles.

UNIT -V AUTOMATIC TRANSMISSION:

Chevrolet "turbo glide" transmission, power glide transmission, hydraulic control system of automatic transmission; Electric drive: advantages and limitations, principle of early and modified Ward-Leonard system, modern electric drive for buses; performance characteristics.

Course Outcomes:

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

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1. Identify components and processes involved in air refrigeration cycles
2. Analyze the working principles and limitations of standard Vapour Compression Refrigeration systems.
3. Evaluate the performance of different refrigeration system equipment like compressors, condensers, etc.
4. Interpret psychrometric properties and processes using psychrometric charts.
5. Develop strategies for optimizing air-conditioning systems based on specific requirements and conditions.

Text & References Books:

1. Heldt P.M.; Torque converters; Chilton Book Co.
2. Giri NK; Automobile Engineering; Khanna Publisher
3. Newton, Steeds & Garret; Motor Vehicles; B.H. Publication.
4. Judge, A.W., Modern Transmission Systems, Chapman & Hall Ltd.
5. Check Chart; Automatic Transmission; Harper & Row Publication.

List of Experiments:

1. Study of transmission of front and rear engine vehicles
2. Study of front and rear-wheel-drive vehicle
3. Study of four wheel-drive vehicles
4. Study of various gear boxes and pre synchronization systems
5. Study of fluid couplings, hydrodynamic drives and torque converters
6. Automatic transmission system study.

Laboratory Course Outcomes:

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

- CO1: Describe the concept of gear motions, drive line positions.
CO2: Explain about different types of gearboxes.
CO3: Know about the multi stage and poly phase torque converters, performance characteristics.
CO4: Demonstrate about Automatic transmission.
CO5: Learn about the different drive systems.
CO6: Apply the mechanics of transmission system.



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Item ME7	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered for batches admitted in 2022-23 in online mode under Departmental Elective (DE) Course with credit transfer, in the VI Semester.
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S.No.	Automobile Engineering			Mechanical Engineering		
	Subject Code	Category	Subject Name	Subject Code	Category	Subject Name
1.	2190661	DE	Fundamentals of Automotive Systems	2120661	DE	Fundamental of Welding Science and Technology
2.	2190662	DE	Viscous Fluid Flow	2120662	DE	Viscous Fluid Flow
3.				2120663	DE	Properties of Materials (Nature and Properties of Material: III)



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Item ME8	To review and finalize the courses & syllabi to be offered (for batch admitted in 2022-23) under the Open Category (OC) Courses to be offered in traditional mode for B Tech VI semester of other departments along with their COs.
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910129: Concepts of Mechanical Systems

Category	Title	Code	Credit-1			Theory Paper
Open Category	Concepts of Mechanical Systems	910129	T	T	P	Max Marks-50 Duration-2 hrs
			1	-	-	

Course objectives: To make the student to:

1. Develop the fundamentals of Engineering materials and reciprocating machines
2. Develop an ability to understand the Thermodynamic laws, Fluid mechanics and Machine design concepts for solving engineering problems
3. Understand the concept of measurement and production machines
3. Demonstrate Engines fundamentals using models.

Syllabus

UNIT-I:

Engineering Materials: Classification, composition of cast iron and carbon steels on iron-carbon diagram and their mechanical properties; Alloy steel and their applications; Stress-Strain diagram, Tensile, shear, hardness and fatigue testing of materials.

UNIT-II:

Measurement and Machine Tools: Concept of measurement error & uncertainty analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges and sine-bar. Introduction to lathe drilling, milling and shaping machines.

UNIT-III

Fluids Mechanics and Hydraulic machines: Fluid properties: pressure, density and viscosity; static and kinetic energy; Bernoulli's equation for incompressible fluids, viscous and turbulent flow, Pelton, Francis and Kaplan turbines, Hydroelectric power plants

UNIT-IV

Thermodynamics and Reciprocating Machines: Zeroth, First, second and third law of thermodynamics, classification and working of water tube and Fire tube boilers, natural and induced draught, Refrigeration, vapour absorption and compression system, coefficient of performance (COP), Working of two stroke & four stroke petrol and diesel IC engines

UNIT-V

Design Concepts: Design process, Factor of safety, design standards and units, Material selection in Mechanical Design, Introduction to 2D and 3D modules, Concept of computer aided drafting and Machine drawing, Stress concentration, Fatigue- cyclic loading

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

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1. Define the essential concepts of thermal, design and production used in Mechanical Engineering.
2. Summarize fundamental techniques and process used in power generating machines
3. Solve the various problems based on basic concepts of various tracks of Mechanical Engineering
4. Apply the design procedure for solving and drafting the different design of machine elements
5. Evaluate the problems of Thermodynamics, Hydraulic machines and I.C. engine
6. Generate the skills to demonstrate Hydraulic machines and reciprocating machine in depth

Text & References Books:

1. Narula; Material Science; TMH
2. Agrawal B & CM; Basic Mechanical Engineering; TMH
3. Nag PK, Tripathi et al; Basic Mechanical Engineering; TMH
4. Rajput; Basic Mechanical Engineering
5. Bhandari VB, Design of Machine elements; Tata McGraw Hill Book Co
6. Machine Design by Mubeen, Pearson



910130: Digital Manufacturing

Category	Title	Code	Credit-3			Theory Paper
			L	T	P	
Open Category-OC	Digital Manufacturing	910130	3	-	-	Max.Marks-50 Duration-2 hrs.

Course Objectives: To make the student to understand:

1. The knowledge on the integrated use of automated system, processes and tools in design and manufacturing.
2. The basics of Additive manufacturing used in various industry applications. Further it will expose the students to additive manufacturing technology using 3-D printing.

Syllabus

UNIT-I DIGITAL DESIGN AND MANUFACTURING FUNDAMENTALS: Elements of computer Aided design, Design Processes Creating manufacturing data base: The design Workstation, Graphics terminal, The software configuration of graphic packages, Constructing and Geo-modeling, Wire frame versus Solid Modeling.

UNIT-II ADDITIVE MANUFACTURING AND PROTOTYPING TECHNIQUES: From classical to Additive manufacturing, 3D Printers and Printable Materials, 3D Printer Workflow and Software, Selecting a Printer: Comparing Technologies, Working with a 3D Printer, 3D Models, Applications, Building Projects.

UNIT-III CNC TECHNOLOGY: Basic elements, Drive Mechanism, Main drive, feed drive, ATC, Control systems, Feedback devices, Input media and coding formats. Manual part programming for Lathe, Drilling and Milling machines, Computer assisted part programming languages APT, adaptive control.

UNIT-IV GROUP TECHNOLOGY & FLEXIBLE MANUFACTURING SYSTEMS: - GT Part Families, Classification & coding, M/C Cell Design, Benefits of GT, FMS Workstations, Material Handling & Storage Systems, Computer Control System, Planning of FMS Analysis Methods. Basic Elements of an Automated system, Levels of Automation.

UNIT-V ROBOTICS IN DIGITAL MANUFACTURING: Industrial Robots and their applications for transformational and handling activities. Configuration and motions, robot classification and their performance capabilities, hardware of robots, Actuators, sensors and end effectors, selecting assembly machines Feeding and transfer of arts, applications of robots in manufacture and assembly.

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

1. Highlight the knowledge of a 3D printer, how to use a 3D printer and how to assemble a 3D printer.
2. Express basic drawing skills to design simple 3D design using open source 3D drawing software (Free CAD).

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3. Choose the components of computer integrated manufacturing and integrate them in a coordinated manner.
4. Correlate automated material handling systems, automated inspection systems and finally creating FMS.
5. Assess small robots and DIY projects where they can accommodate simple designs to printed parts and make it live.

Text & References Books:

1. Automation, Production system and computer integrated manufacturing by M.P. Groover, PHI publication.
2. CAD/CAM by P. N. Rao, P. N. Rao, Tata McGraw Hill publication
3. Computer control of machine tools by Koren Yoram, Tata McGraw Hill publication
4. Manufacturing Engineering And Technology by Serope Kalpakjian, PHI publication.
5. CAD/CAM/CIM by Bhupendra Gupta, Dhanpat Rai publication
6. Gibson, Rosen, Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing. Springer, 2009.
7. Hopkinson, Hague, Dickens, Rapid Manufacturing: An Industrial Revolution for the Digital Age. Wiley, 2005.

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910131: Process Planning and Cost Estimation

Category	Title	Code	Credit -3			Theory Paper
			L	T	P	
Open Category-OC	Process Planning and Cost Estimation	910131	3	-		Max.Marks-50 Duration-2 hrs.

Course Objectives

- 1.To link design and manufacturing.
2. To determine the process and sequence of operations to obtain a useful final product. In companies, process planning is used to increase the output of the business.

Syllabus

UNIT I INTRODUCTION TO PROCESS PLANNING

Introduction- methods of process planning-Drawing Interpretation-Material evaluation – steps in process selection- Production equipment and tooling selection

UNIT II PROCESS PLANNING ACTIVITIES

Process parameters calculation for various production processes-Selection jigs and fixtures election of quality assurance methods – Set of documents for process planning-Economics of process planning- case studies

UNIT III INTRODUCTION TO COST ESTIMATION

Importance of costing and estimation –methods of costing-elements of cost estimation –Types of estimates – Estimating procedure- Estimation labor cost, material cost- allocation of overhead charges- Calculation of depreciation cost

UNIT IV PRODUCTION COST ESTIMATION

Estimation of Different Types of Jobs – Estimation of Forging Shop, Estimation of Welding Shop, Estimation of Foundry Shop

UNIT V MACHINING TIME CALCULATION

Estimation of Machining Time – Importance of Machine Time Calculation- Calculation of Machining Time for Different Lathe Operations, Drilling and Boring – Machining Time Calculation for Milling, Shaping and Planning -Machining Time Calculation for Grinding.

Course Outcomes

- Upon the completion of this course the students will be able to
- CO1. Select the process, equipment and tools for various industrial products.
 - CO2. Prepare process planning activity chart.
 - CO3. Explain the concept of cost estimation.
 - CO4. Compute the job order cost for different type of shop floor.
 - CO5. Calculate the machining time for various machining operations.

Text Books:

1. Peter scalon, "Process planning, Design/Manufacture Interface", Elsevier science technology Books, Dec 2002.
2. Sinha B.P, "Mechanical Estimating and Costing", Tata-McGraw Hill publishing co. 1995

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Item ME9	To review and finalize the Experiment list/ Lab manual/Skill based mini-project for all the Laboratory Courses to be offered in B.Tech.VI semester (for batch admitted in 2022-23).
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Mechanical/Automobile Engg. VI Sem		
S.No.	Subject Code	Subject Name
1	2120611	RAC
2	2190611	Automotive Transmission

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2120611: Refrigeration and Air-conditioning

List of Experiments (Expandable):

1. Demonstration of fundamental study of Absorption Refrigeration System.
2. Demonstration of C.O.P. and Performance of Air-Conditioner.
3. Study of Vapour Compression cycle .
4. Determination of C.O.P. in Vapour compression Refrigeration system.
5. Demonstration of Electrolux Refrigerator.
6. Equipment and controls of Refrigeration Systems.
7. Equipment and controls of Air Conditioning Systems
8. To study duct and induct type AC
9. To study refrigeration and fault simulator
10. Demonstration of C.O.P. and other performance parameters for Mech. Heat Pump.

Laboratory Course outcomes:

After the successful completion of this course, the student will be able to:

1. **Calculate** the COP of heat pump and refrigerator.
2. **Obtain** cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems.
3. **Analyze** the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.
4. **Develop** thermal comfort conditions with respect to temperature and humidity

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2190611: Automotive Transmission

List of Experiments:

1. Study of transmission of front and rear engine vehicles
2. Study of front and rear-wheel-drive vehicle
3. Study of four wheel-drive vehicles
4. Study of various gear boxes and pre synchronization systems
5. Study of fluid couplings, hydrodynamic drives and torque converters
6. Automatic transmission system study.

Laboratory Course Outcomes:

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

- CO1: Describe the concept of gear motions, drive line positions.
CO2: Explain about different types of gearboxes.
CO3: Know about the multi stage and poly phase torque converters, performance characteristics.
CO4: Demonstrate about Automatic transmission.
CO5: Learn about the different drive systems.
CO6: Apply the mechanics of transmission system

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Item	
ME10	To review and finalize the scheme structure of B. Tech. IV Semester under the flexible curriculum (for batch admitted in 2023-24)



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Scheme of Evaluation
B. Tech IV Semester (Mechanical Engineering)

(for batch admitted in academic session 2023-24)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam
				Theory Slot			Practical Slot				End Sem. Exam	Continuous Evaluation	Skill Based Mini Project							
				End Term Evaluation			Continuous Evaluation		Lab Work & Sessional											
				End Sem. Exam	5 Proficiency	Mid Sem. Exam.	Quiz/ Assignment	Continuous Evaluation												
1.	3100028	BSC	Engineering Mathematics-III	50	10	20	20	-	-	-	-	-	100	3	1	-	4	Blended	PP	
2.	3120411	DC	Industrial Engineering	50	10	20	20	-	-	-	-	-	100	2	1	-	3	Blended	PP	
3.	3120412	DC	Design of Machine Elements	50	10	20	20	60	20	20	20	20	200	2	1	2	4	Blended	AO	
4.	3120413	DC	Dynamics of Machines	50	10	20	20	60	20	20	20	20	200	2	1	2	4	Blended	AO	
5.	3120414	MC	Cyber Security	50	10	20	20	-	-	-	-	-	100	2	-	-	2	Blended	MCQ	
6.	3120415	DLC	Production Lab	-	-	-	-	60	20	20	20	20	100	-	-	4	2	Offline	SO	
7.	200xxx	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	50	-	-	2	1	Interactive	SO	
Total				250	50	100	100	230	60	60	60	60	850	11	4	10	20	-	-	
8.	3000002	Natural Sciences & Skills	Engineering Chemistry	50	10	20	20	30	10	10	10	10	150	1	-	2	Grade	Blended	MCQ	
9.	1000001	NIAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	-	-	100	2	-	-	Grade	Online	MCQ	
Summer Internship Project – II (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in V Semester.																				
SP Proficiency in course/subject – Includes the weighted average for each semester. A minimum of 50% is required for progression to the next semester.																				

Summer Internship Project – II (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in V Semester.
SP Proficiency in course/subject – includes the weightage towards ability/skill/competency/knowledge level/expertise attained etc. in that particular course/subject.
Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Science/ Language.

Credits of Natural Sciences & Skills will be added in the VI Semester.

10,3000004 NSC – Language C for lateral entry and branch transfer students
AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral
MCQ: Multiple Choice Question

Mode of Teaching				Mode of Examination				Total Credits
Theory		Blended	Lab		Theory		Lab	
Offline	Online		Offline	PP	AO	MCQ		SO
0	0	17	11	4	2	3	20	
0	0	85%	55%	20%	10%	15%		
Course Outcomes								



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Department of Mechanical Engineering

For batch admitted in Academic Session 2023-24



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Item ME11	To review and finalize the syllabi for all Departmental Core (DC) Courses of B. Tech. IV Semester (for batch admitted in 2023-24) under the flexible curriculum along with their COs.
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3120411: Industrial Engineering

Category	Title	Code	Credits: 3			Theory Paper
			L	T	P	Max Marks-50 Duration-2hrs
Departmental Core-DC	Industrial Engineering	3120411	2	1	-	

Course Objectives: Industrial engineering is concerned with the design, improvement, installation, and management of integrated systems of men, material, and machine. After completing this course, students will learn a set of skills that includes mathematical modeling, probability and statistics, computer science, human factors, interpersonal skills, project management, and an ability to manage and administer large technical engineering and research projects. Thus, industrial engineering may be thought of as applied problem-solving, from inception to implementation.

Syllabus

UNIT-I

Production Systems and Productivity: Design of production systems (product, job shop and batch), Types of Production System, Definition and types of productivity, Measurement of productivity, factors affecting the productivity and productivity improvement programs.

Production Planning and Control: Needs of Production Planning and control, objectives of PPC, Principles of PPC, Functioning of PPC, Factor determining the PPC and Elements of PPC.

UNIT-II

Demand Forecasting: Introduction, demand patterns, Need and classification of forecasting techniques, factors affecting forecasting, time series analysis, qualitative methods- measures of forecast accuracy and error analysis in quantitative forecasting.

Aggregate Planning: Introduction to Aggregate Planning, Factors affecting aggregate planning, objectives and aggregate planning strategies, aggregate planning methods.

UNIT-III

Inventory Control: Meaning and types of inventories, objectives, and functions, need and classifications- codification and standardization, inventory control terminology, inventory cost relationship, deterministic and probabilistic inventory models, quantity discount, Probabilistic inventory management, economic ordering quantity procurement cost, carrying charges, lead-time, reorder point, selective control of inventory

UNIT-IV

Master Production Scheduling and MRP: Functions, planning horizon and planning periods for master production schedule, types of master production schedule, Bill of Material, Independent Demand versus dependent demand, Functions of material requirements planning and manufacturing resource planning (MRP I and MRP II), inputs for MRP system, performance characteristics of MRP system, materials requirement planning explosion.

Unit-V

Production Scheduling and control: Production control outline, Gantt chart, n jobs and 2 machine problems, n jobs and 3 machine problems, Johnson's algorithm, scheduling strategies, concept of single machine scheduling, shortest Processing time rule, earliest due date, Model to Minimize total tardiness, branch, and bound technique to minimize tardiness. Floor shop scheduling, Job shop scheduling



Facility Locations, Plant Layout and Material Handling: Facility location factors and evaluation of alternate locations; qualitative aspects, quantitative models for layout decisions, types of plant layout and their evaluation; computer aided layout design techniques; assembly line balancing, materials handling systems.

Course outcomes: After learning the course the students should be able to:

1. Apply the concept of productivity measurement and production systems
2. Compute the demand forecasting in a dynamic market environment
3. Calculate economic order quantity (EOQ) for a given set of inventory parameters
4. Apply the principles of material requirements planning (MRP)
5. Evaluate the efficiency of different scheduling strategies in meeting production deadlines

Text Books:

1. Industrial Engineering and Production Management, Martand Telsang, S. Chand
2. Production and Operation Management by R. Panneerselvam, PHI, Latest Edition
3. Manufacturing planning and control for SCM by Vollmann; TMH, Latest Edition.
4. Purchasing & Materials Management by Dobler & Lee, PHI, Latest Edition

Reference Books:

1. Operations Management by Krajewski, L. J., Ritzman, L. P. and Malhotra, M. K., Prentice Hall, New Delhi; Latest Edition.
2. Production/Operations Management by Ebert, J and Adams, D.J., Prentice Hall of India, New Delhi; Latest Edition.
3. Production and Operations Management: manufacturing and services by Chase, R. B., Aquilano, N. J. and Jacob, F. R., TMH, New Delhi; Latest Edition.
4. Modern Production/Operations Management by Buffa and Sarin, Wiley India; Latest Edition.

List of Open Source Software/learning website:

1. Operation Management, IIT Roorkee, Dr. Inderdeep singh, <https://nptel.ac.in/courses/112107238>
2. Operation and Supply chain Management, IIT Madras, Prof. G. Srinivasan
<https://nptel.ac.in/courses/110106045>

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3120412: Design of Machine Elements

Category	Title	Code	Credit-4			Theory Paper
			L	T	P	
Departmental Core-DC	Design of Machine Elements	3120412	2	1	2	Max. Marks-35 Duration-2 hrs.

Note: Use of PSG Design Data book is permitted in exam.

Course Pre-Requisites:

Mathematics-I

Mechanics of Materials

Course Objectives: To make the students:

1. Able to identify, formulate and solve design engineering problems.
2. Develop an ability to use the techniques, skills and modern design engineering tools necessary for engineering practice.
3. Demonstrate the ability to make proper assumptions, perform correct analysis while design upon various mechanical machine elements.

Syllabus

Unit-I Introduction: Design process, Factor of safety, design standards and units, Material selection in Mechanical Design, surface finish symbols, Surface Roughness, limit, fit, and tolerance, Gauge design, Tolerance analysis in manufacturing and assembly, Design for Manufacturability, Comparison between conventional design process and modern design process

Unit-II Bolted, Riveted and Welded joints: Definition, Nomenclatures, Classifications, Applications, Methods of joining, Loadings & Failures, Design procedures, Eccentric loading problems.

Unit-III Cotter and Knuckle joints: Definitions, Nomenclature, Classifications, Comparison between keys and cotters, Design of Socket and spigot cotter joint, Sleeve type Cotter joint, Cotter with Gib, Knuckle Joint, Suspension link, Pin joint, Adjustable joint, Turn-buckle.

Unit-IV Shafts, Keys and Couplings: Definitions, Classifications and Applications. Design under various loads and cases.

Unit-V Theories of Failures: Maximum normal stress and shear stress theory, maximum normal strain and shear strain theory, maximum distortion energy theory. Applications of theories to different material. Introduction to 2D, 3D modules and tools, Fundamentals and applications of CAD/CAM. Concept of computer aided drafting and Machine drawing.

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

1. Design a mechanical component considering tolerances and fits.
2. Design a welded joint considering specific applications and loading conditions
3. Design a cotter joint for a given mechanical application.
4. Design a coupling for a given mechanical system.
5. Design a simple 2D or 3D module using CAD tools.

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Text & Reference Books

1. Mechanical Engineering Design by Shigley JE et al; TMH
2. Machine Design by Mubeen
3. Design of Machine elements by Bhandari VB; TMH
4. Text Book of Machine Drawing by John KC; PHI Learning
5. Engineering design – George Dieter, MGH, New York.
6. Machine Drawing by Bhat, ND; Charotar.
7. Machine Drawing by Narayana and Reddy; New age, Delhi.
8. Design data book by PSG
9. Fundamental of Engg Drawing Interactive Graphics by Luzzader WJ, Duff JM; PHI.
10. Mechanical design data book by Mahadevan and Reddy's; CBS

NPTEL Link for Design of Machine Elements

<http://nptel.ac.in/courses/112105124/>

List of Experiments

1. Design and drawing of Single, double and triple riveted joint
2. Design and drawing of Single and double strap butt joint
3. Design and drawing of Welded joint
4. Design and drawing of Socket and Spigot cotter joint
5. Design and drawing of Gib and Cotter joint.
6. Design and drawing of Knuckle joint
7. Study of Theories of failure
8. Design and drawing of Solid and hollow shaft
9. Design and drawing of Rigid coupling
10. Design and drawing of Flexible coupling

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

CO1 Design and analysis the different part of an I.C Engine like Piston, cylinder, connecting rod, crank shafts, flywheel.

CO2 Compare the materials used in designing the automobile engine parts.

CO3 Use the software like AUTO CAD, CATIA, PRO/E, SOLID WORKS.

CO4 Select the spring for a proper application also can select the proper material of spring.

CO5 Design the different types of gear like spur gear, helical gear, worm gear, bevel gear and also able to know their practical applications.

CO6 Create a gear box for modern Automotive vehicles and can use this for the benefits of society.

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3120413: Dynamics of Machines

Category	Title	Code	Credit-4			Theory Paper
			L	T	P	Max Marks-35 Duration-2 hrs
Departmental Core-DC	Dynamics of Machines	3120413	2	1	2	

Course Pre-Requisite

Engineering Mechanics

Kinematics of Machines (3120332)

Course Objective: To make students able to:

1. Understand the principles of gears and gear trains, including their classification, terminology, and design.
2. Perform balancing of rotating and reciprocating mechanical systems.
3. Analyze mechanical vibration phenomena, including undamped, damped, and forced vibrations.

Syllabus

Unit- I Gears: Classification, Terminology, Law of gearing, Forms of teeth, Tooth profile, Cycloidal and Involute tooth forms, path of contact, teeth in contact, Interference, Spur, Helical, Spiral, Worm and Bevel gears.

Unit- II Gear Trains: Simple, Compound, Reverted and Epicyclic gear trains, Velocity Ratio. Various applications of gear trains - Motor car gear box, Differential mechanism, cyclometer mechanism etc.

Unit-III Balancing: Introduction, Balancing of rotating and reciprocating masses, Locomotive balancing, Balancing of multi cylinder in line engines, Balancing of radial engines, Direct and reverse crank method of balancing.

Unit-IV Mechanical Vibrations Importance and scope of vibrations, Definitions, Types of vibrations, Simple Harmonic Motion (S.H.M.), Work done by harmonic force, Principle of super position applied to SHM, Beats, Fourier transform and problems.
Undamped (Single Degree of Freedom) Free Vibrations: Derivations for spring mass systems, Methods of analysis, Natural frequencies of simple systems, Springs in series and parallel, Torsional and transverse vibrations, Effect of mass of spring and Problems.

UNIT-V Damped free vibrations (1DOF): Types of damping, Analysis with viscous damping - Derivations for over, critical and under damped systems, Logarithmic decrement and Problems.
Whirling of shafts: Whirling of shafts with and without damping, discussion of speeds above and below critical speeds and Problems.

Forced Vibration: Introduction, Analysis of forced vibration with constant harmonic excitation - magnification factor, rotating and reciprocating unbalances, excitation of support (relative and absolute amplitudes), force and motion transmissibility, Energy dissipated due to damping and Problems.

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

- CO1: Understand the concepts of gears
- CO2: Analyze gear train systems for velocity ratio and applications
- CO3: Perform balancing of mechanical systems
- CO4: Evaluate the behavior of undamped mechanical vibration systems
- CO5: Analyze and design systems with damping and forced vibrations

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Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

Text & References Books:

1. Design of Machinery by Robert L. Norton; TATA McGraw Hill.
2. Theory of Machines by S S Rattan; Tata McGraw Hill.
3. Theory of Machines by R S Khurmi; J K Gupta; S. Chand.
4. Mechanism & Machine Theory by Ashok G. Ambekar; PHI (Prentice-Hall India).
5. Theory of Machines by Sadhu Singh; Pearson Education.
6. Theory of Machines and Mechanisms by P L Ballaney; Khanna Publishers.
7. Theory of Machines by R K Bansal; Laxmi Publications.

NPTEL Link for Theory of Machines-II

<http://nptel.ac.in/courses/112104121/1> and <http://nptel.ac.in/courses/112104114/>

List of experiments

1. Study of various types of gears.
2. Study of various types of gear trains.
3. Balancing of rotating masses.
4. Balancing of reciprocating masses.
5. To verify the relation of simple and compound pendulum.
6. To study Undamped free vibration of equivalent spring mass system.
7. To study Damped free vibration of equivalent spring mass system.
8. To study the forced vibration of spring mass system
9. To determine the whirling of shaft.
10. Calculate the epicyclic gear ratio, input torque, holding torque and output torque.

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

- CO1: Identify different types of gears and gear trains.
CO2: Analyze the balancing of rotating and reciprocating masses.
CO3: Evaluate the dynamic behavior of simple pendulum systems.
CO4: Investigate free and damped vibration systems.
CO5: Analyze forced vibration systems and whirling of shafts.
CO6: Determine gear ratios and torque in epicyclic gear trains.

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3120415: Production Lab

Category	Title	Code	Credit-2			Practical Slot
Departmental Lab Core-DLC	Production Lab	3120415	L	T	P	Max.Marks-60
			-	-	4	Min.Marks-19

Course Objective:

1. To demonstrate the fundamentals of machining processes and machine tools.
2. To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.
3. To apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, etc.

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.
9. Performance on mold making of Simple component.
10. Performance on pattern making of Simple component.
11. Performance on Metal Casting of Simple component.
12. Performance on Welding of simple work piece (Example Arc Welding)
13. Performance on Sheet Metal work of Simple component.
14. Performance on hot forging of Simple component
15. All Students must complete one skill based project assigned by faculty

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

CO1 Demonstrate the failure occurs during manufacturing process.

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.

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Department of Mechanical Engineering

For batch admitted in Academic Session 2023-24



Item ME12	To review and finalize the Experiment list/ Lab manual/Skill based mini-project for all the Laboratory Courses to be offered in Batch IV semester (for batch admitted in 2022-23).
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Mechanical Engineering		
S.No.	Subject Code	Subject Name
1	3120412	Design of Machine Elements
2	3120413	Dynamics of Machines
3	3120415	Production Lab

Slits    
   



3120412: Design of Machine Elements

List of Experiments

1. Design and drawing of Single, double and triple riveted joint
2. Design and drawing of Single and double strap butt joint
3. Design and drawing of Welded joint
4. Design and drawing of Socket and Spigot cotter joint
5. Design and drawing of Gib and Cotter joint.
6. Design and drawing of Knuckle joint
7. Study of Theories of failure
8. Design and drawing of Solid and hollow shaft
9. Design and drawing of Rigid coupling
10. Design and drawing of Flexible coupling

Laboratory Course Outcomes:

After the completion of the course Lab students will be able to

- CO1 **Design** and analysis the different part of an I.C Engine like Piston, cylinder, connecting rod, crank shafts, flywheel.
- CO2 **Compare** the materials used in designing the automobile engine parts.
- CO3 **Use** the software like AUTO CAD, CATIA.
- CO4 **Select** the spring for a proper application also can select the proper material of spring.
- CO5 **Design** the different types of gear like spur gear, helical gear, worm gear, bevel gear and also able to know their practical applications.
- CO6 **Create** a gear box for modern Automotive vehicles and can use this for the benefits of society.

Skill Based Project

1. FEA of lap joint based on various geometrical parameters to study the behaviour of weld strength
2. Simulation of welding to study residual stress and distortions
3. Analysis of composite multi leaf spring using ANSYS 2020 R1
4. Heat Transfer analysis for different materials of ball bearing using ANSYS 2020 R1
5. Numerical analysis of Modified tooth in Spur Gear for increasing the performance by reducing the assembly errors and gear slippage in the axial direction during dynamic loading

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ME20413: Dynamics of Machines

List of experiments

1. Study of various types of gears.
2. Study of various types of gear trains.
3. Balancing of rotating masses.
4. Balancing of reciprocating masses.
5. Study of kinematic synthesis of mechanisms.
6. Study of cams and followers.
7. To draw cam profile, velocity and acceleration diagrams of a given cam-follower mechanism.
8. Draw the profile of various cams with different types of followers.
9. Plot the follower displacement vs angle of cam rotation curves for changing compression spring, follower weights and cam speed.
10. Calculate the epicyclic gear ratio, input torque, holding torque and output torque.

Course Outcomes:

- CO1 Identify the kinematic chain and mobility, and perform the kinematic analysis of a given mechanism.
- CO2 Analyze various motion transmission elements like gears, gear trains, cams, belt drive and rope drive
- CO3 Determine the degrees-of-freedom (mobility) of a mechanism
- CO4 Apply the fundamental principles of statics and dynamics to machinery.
- CO5 Evaluate the dynamic forces for various machines.
- CO6 Analyze the fundamentals of machines for desired kinematic or dynamic performance.

Skill Based Project

1. Development of various toy mechanisms.
2. Design of easy (make/use) cycle.
3. Working model of epicyclic gear train.

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ME0413: Production Lab

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 Shofing Machine.
6. Hole on work piece through Drilling.
7. Grinding of Single Point Cutting Tool
8. Slot / Groove cutting using shaping machine.
9. Performance on mold making of Simple component.
10. Performance on pattern making of Simple component.
11. Performance on Metal Casting of Simple component.
12. Performance on Welding of simple work piece (Example Arc Welding)
13. Performance on Sheet Metal work of Simple component.
14. Performance on hot forging of Simple component

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.

Skill Based Project

1. Design and simulation of venting passages to prevent blow hole defect.
2. Development of low-cost experimental setup to study metal flow through gating channels.
3. Preparation of different types of patterns by using wax/wood material.
4. Fabrication of working model of brazing and soldering setup.
5. Preparation of educational wooden model of different types of furnaces.
6. Working model of the coining machine and prepare the die for the coining.
7. Fabrication of plastic injection molding machine by using extrusion principle.

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8. Preparation of educational model of powder metallurgy setup.
9. Demonstration model of MIG and TIG setup.
10. Battery operated working model of lathe machine.
11. Working setup of Arduino CNC plotter.
12. Working model of foot operated hammering machine for forging purpose.

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Item ME13	To finalize the Skill Internship Project (SIP) module to be offered in Dec 2024.
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S.No.	Name of Module	Name of Faculty
1	Hands on practice on conventional machining	Dr. S K Chourasiya
2	Introduction to AUTO CAD for Engineering Applications	Prof. Sharad Agrawal
3	Hands on practice on Casting Technology	Dr. Gavendra Norkey
4	Hands on practice on Welding Technology	Prof. R P Kori
5	Precision Machining and Metrology Workshop	Prof. Vaibhav Shivhare

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Madhav Institute of Technology and Science Name of Department: Mechanical Engineering				
S.No.	Name of Module	Name of Module coordinators	Objectives	Content
1	Hands on practice on conventional machining	Dr. S K Chourasiya	1. To familiarize with the basics of tools and equipment's used in different machining operations 2. To Provide the specific skill and knowledge of the integral part of production in above trades. 3. To develop general machining skills in the students.	1. Introduction to Material Science, its importance in material process, removal 2. Introduction to Conventional Machines, types, importance, advantages and disadvantages, quiz 3. Introduction to Tool, different tool 4. Tool nomenclature, its effects on MRR, etc. 5. Introduction to Lathe, Types, Construction and Operation, Assignment 6. Introduction to Drilling Machine, Types, Construction and Operations, Assignment 7. Introduction to Grinding process, Grinding wheels, Machines 8. Introduction to Shaper and Slotter machines, machining time estimation 9. Introduction to Milling machines and gear cutting 10. Machining time estimation
				Outcomes "1. Apply cutting mechanics to metal machining based on cutting force and power consumption. 2. Operate lathe, milling machines, drill press, grinding machines, etc. 3. Select cutting tool materials and tool geometries for different metals. 4. Choose appropriate machining processes and conditions for different metals. 5. Identify the process parameters, their effect and applications of different processes"

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2	Introduction to AUTOCAD for Engineering Applications	Prof. Sharad Agrawal	Students will be able to 1. Understand the AutoCAD workspace and user interface. 2. Use basic drawing, editing, and viewing tools. 3. Organize drawing objects on layers. 4. Add text, hatching and dimensions.	1. Drawing commands such as Line command, Poly line command, Rectangle command etc. 2. Modify commands such as Move, Rotate, Scale, copy, Mirror, erase, trim, extend etc. 3. Interactive Input method such as grid, snap, ortho mode etc. 4. Introduction to Annotate Dimension Style Manager such as Linear, Aligned, Radius Angular, Arc length etc. 5. Text command Layers blocks such as Single line text, Multiline text, Layer properties, Insert blocks etc. 6. 2D Fundamentals such as Drawing units, Sheet settings etc. 7. Introduction to Create and Save Auto CAD such as Save files, Export pdf plot, Print Sheet etc. 8. Exercise - 5 (Practice using Auto CAD)	After successful completion of this module, student will be able to create, annotate, edit and plot drawings of different mechanical components using basic AutoCAD commands and features.
3	Hands on practice on Casting Technology	Dr. Gavendra Norkey	1. To understand the casting phenomenon. 2. To enhance the casting knowledge. 3. To develop casting skill.	1. Fundamentals of casting processes 2. Moulding materials and their requirements 3. Types and various pattern materials. 4. How to make pattern? 5. How to use casting methods 6. Various defects and their remedies 7. Hands on practice of casting products 8. Casting process of metal casting processes 9. Machining / Disadvantages of metal casting processes 10. Advantages of Casting (Metal : Ferrous and Non ferrous) 11. Applications of Casting (Metal : Ferrous and Non ferrous) 12. Group Assignment or Task	1. After completion of module students will be able to abundant knowledge in casting domain. 2. After completion of module, students will be able to "ready to casting". 3. After completion of module students will be able to find casting defects.
4	Hands on practice on Welding Technology	Prof. R P Kori			

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Department of Mechanical Engineering

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Precision Machining and Metrology Workshop	Prof. Vaibhav Shivhare	To familiarize interns with lathe operation techniques and safety protocols. To introduce interns to essential measuring tools and their applications. To provide hands-on experience in precision machining and metrology. To cultivate practical skills for effective manufacturing processes.	*Introduction to Lathe Operations Safety procedures and guidelines in the workshop. Overview of lathe machine components and their functions. Basic lathe turning operations: facing, turning, drilling, and threading. *Advanced Lathe Techniques Practical exercises on operating the lathe under supervision. Understanding different lathe tools and their applications. Taper turning and knurling techniques. Practical sessions on precision turning and finishing. Troubleshooting common lathe problems. *Introduction to Measuring Tools Overview of common measuring instruments: calipers, micrometers, dial indicators, etc. Principles of measurement and accuracy. Calibration and maintenance of measuring tools. Hands-on exercises on measuring workpieces accurately. *Project Work and Assessment Interns will work on a small project integrating lathe operations and metrology techniques. Supervised project work with emphasis on precision, accuracy, and presentation and assessment of projects. This module aims to provide a comprehensive understanding of lathe operations, measurement tools, and metrology techniques, preparing interns for practical applications in manufacturing and engineering industries.	Practical Skills: Interns will gain hands-on expertise in lathe operation and precision measurement. Understanding Manufacturing Processes They'll grasp the fundamentals of machining and metrology. Application of Techniques Interns will apply advanced measurement methods and software. Quality Assurance: They'll learn how metrology ensures product precision and accuracy. Project Experience: Interns will integrate lathe work with metrology in practical projects. Safety Awareness: They'll prioritize safety in workshop environments. Professional Growth: Through feedback, interns will enhance their skills and readiness for future roles in engineering and manufacturing.
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Mechanical CO Attainment JAN-JUNE 2024

4th Semester Mechanical Engg. (B. Tech)			Indirect CO Attainment (Through Feedback)						Direct CO Attainment (Through Exams)						Total CO Attainment (20% Indirect + 80% Direct)						Target Level	COs not attained	Action Taken							
Subject Code	Subject Name	Faculty I/C	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	COs not attained	Target Level	COs not attained	Action Taken
2100028	Mathematics-III	Math Dept.	2.61	1.88	2.41	1.98	1.89	2.04	2.71	2.29	2.42	2.51	2.61		2.69	2.21	2.42	2.40	2.49		2						2			
2120411	Industrial Engineering	Dr. Nitin Upadhyay	2.44	2.50	2.44	2.25	2.25	1.87	2.37	2.57	2.47	2.21	2.07		2.38	2.56	2.46	2.22	2.11		2						2			
2120412	Design of Machine Elements	Prof. R.P.Kori	2.61	2.17	2.28	2.16	1.87	2.16	1.08	2.39	2.33	2.75	2.00		2.03	2.35	2.32	2.63	1.97								2			
2120413	Theory of Machines-II	Dr. Neeraj Mishra	1.80	2.34	2.55	2.40	2.02	2.45	3.00	2.00	2.00	2.00	1.00		2.76	2.07	2.11	2.09	1.20								2			
2120414	Cyber Security	Dr. Ansh Vimal	1.80	2.54	2.66	1.87	2.40	2.60	2.24	2.09	2.57	2.78	1.90		2.15	2.18	2.59	2.60	2.00		2						2			
3000002	Engineering Chemistry	Applied Science	2.75	2.54	2.35	1.87	2.15	1.82	2.60	2.17	2.37	2.22	2.10	1.80	2.63	2.24	2.37	2.15	2.11	1.80							2			
1000001	Indian Constitution and Humanities		2.72	2.63	2.75	2.48	2.34	2.41	2.78	2.69	2.37	1.20	2.14	2.32	2.77	2.68	2.45	1.45	2.18	2.34							2			
2120415	Production Lab	Dr. Amit Aherwar/Sol	2.48	2.12	2.72	2.60	2.76	2.15	2.19	2.56	1.88	2.34	1.97	2.11	2.25	2.47	2.05	2.39	2.13	2.12							2			
2120412(P)	Design of Machine Elements	Prof. R.P.Kori	1.87	2.66	2.48	1.82	2.24	2.34	2.35	2.05	2.70	2.15	2.22	1.96	2.25	2.17	2.66	2.08	2.22	2.04							2			
2120413(P)	Theory of Machines-II	Dr. Neeraj Mishra	2.75	2.35	1.87	2.41	2.19	2.78	2.01	2.12	2.77	1.93	2.38	2.33	2.16	2.17	2.59	2.03	2.34	2.42							2			
6th Semester Mechanical Engg. (B. Tech)			Indirect CO Attainment (Through Feedback)						Direct CO Attainment (Through Exams)						Total CO Attainment (20% Indirect + 80% Direct)						Target Level	COs not attained	Action Taken							
Subject Code	Subject Name	Faculty I/C	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	COs not attained	Target Level	COs not attained	Action Taken
120615	Mechanical Vibrations	Dr. Nitin Upadhyay	2.41	2.33	2.33	2.36	2.38	2.15	2.80	2.58	2.91	2.74	2.87		2.72	2.53	2.80	2.57	2.81								2			
120616	Refrigeration and Air Con	Dr. M.K.Gaur	1.87	2.60	2.75	1.82	2.24	2.34	2.71	2.00	2.64	2.00	2.00		2.54	2.12	2.66	1.98	2.05								2			
120617	AI & ML	Prof. Vaibhav Sharma	2.48	1.82	2.72	2.41	2.19	2.76	2.09	2.57	2.51	2.69	2.56		2.17	2.42	2.55	2.63	2.49								2			
1000007	Intellectual Property Rights	Dr. C.S.Malvi	2.60	2.30	2.48	2.28	2.40	2.16	2.17	2.37	2.17	2.37	2.17		2.26	2.36	2.23	2.35	2.22								2			
120618	Minor Project-II	Mr. S. Aggarwal	1.82	2.72	2.34	2.55	2.15	2.45	2.68	2.37	2.69	2.37	1.80	2.58	2.52	2.44	2.62	2.41	1.87	2.54							2			
120615(P)	Mechanical Vibrations	Dr. Nitin Upadhyay	2.30	2.48	2.54	2.60	2.34	1.97	2.56	1.88	2.56	1.88	2.60	2.05	2.51	2.00	2.58	2.04	2.55	2.03							2			
120616(P)	Refrigeration and Air Con	Dr. M.K.Gaur	2.68	1.87	2.54	2.35	2.76	2.33	2.05	2.70	2.05	2.70	2.78	2.30	2.17	2.53	2.15	2.63	2.78	2.31							2			







120617(P)	AIML lab	Prof Ajay Rajput	2.32	1.85	2.34	2.05	2.26	2.30	2.12	2.77	2.48	2.76	2.12	1.20	2.16	2.59	2.45	2.62	2.15	1.42	2	CO6	Certain topics that do not fulfil the requirement of lab exercises will be removed and emphasis will be paid to inclusion of exercises directed to attainment of course objectives so as more drills can be given to students
																						COs not attained	Action Taken
8th Semester Mechanical Enggs. (B. Tech)			Indirect CO Attainment (Through Feedback)						Direct CO Attainment (Through Exams)						Total CO Attainment (20% Indirect + 80% Direct)						Target Lev		
Subject Code	Subject Name	Faculty I/C	CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6									
120811	Internship/ Project	Prof Vaibhav Shrivastava	2.42	2.4	2.25	2.37	2.12	2.67	3	3	3	2	2	2	2.88	2.88	2.85	2.07	2.02	2.13	2		
120812	Professional Development		2.60	2.30	2.48	2.28	2.40	2.16	3.00	3.00	3.00	3.00	3.00	3.00	2.92	2.86	2.90	2.86	2.88	2.83	2		

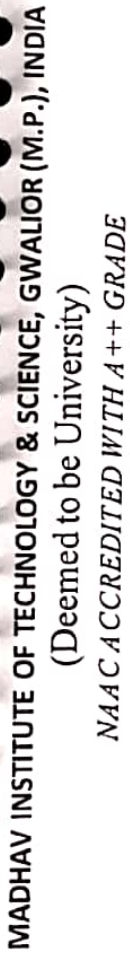












S. No.	Subject	Feedback	Action Taken
1	Fluid Mechanics and Hydraulic machines	More emphasis on theory should be connected in the syllabus Visualization of the machines required	Theory notes and video animations have been provided for better understanding Problem has been modified through online videos
2	Mechanics of materials	Topic related to real life example should be provided Syllabus required modification	Labs connected the real life problems. The syllabus is upto dated but required modification will be done in upcoming BoS
3	Heat and mass transfer	Modern tools and contents should be added.	Industry oriented problems will be added in the tutorial section.

Year	epidemiology	epidemiologic
2006	4.00	3.00
2007	4.00	3.00
2008	4.00	3.00
2009	4.00	3.00
2010	4.00	3.00
2011	4.00	3.00
2012	4.00	3.00
2013	4.00	3.00
2014	4.00	3.00

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	3120331	3120333	3120332	3120334	2190514/2120514	2120513	2120515	1000006	120733	120732
The course is well designed	3.57	4.92	3.57	4.35	4.51	3.29	4.49	4.6	3.88	4.35
The syllabus units are balanced	3.29	4.96	3.29	4.20	4.36	4.36	4.6	4.6	3.88	4.20
The learning material was available to you	3.29	4.35	3.29	3.29	4.35	4.49	4.6	4.6	4.00	3.88
The content was clear and easy to understand	3.29	4.26	3.29	3.29	4.20	4.6	4.6	4.6	3.88	3.88
The course was relevant and updated for present needs	3.29	4.26	3.29	3.29	3.29	4.6	4.2	3.90	3.88	4.00
The course meets your career expectations	4.42	4.88	3.29	4.26	4.36	4.6	4.8	4.26	3.88	3.88
The course will be useful to meet your higher studies/future aspirations.	4.58	4.92	3.29	4.26	4.49	4.6	4.8	4.26	3.88	3.88

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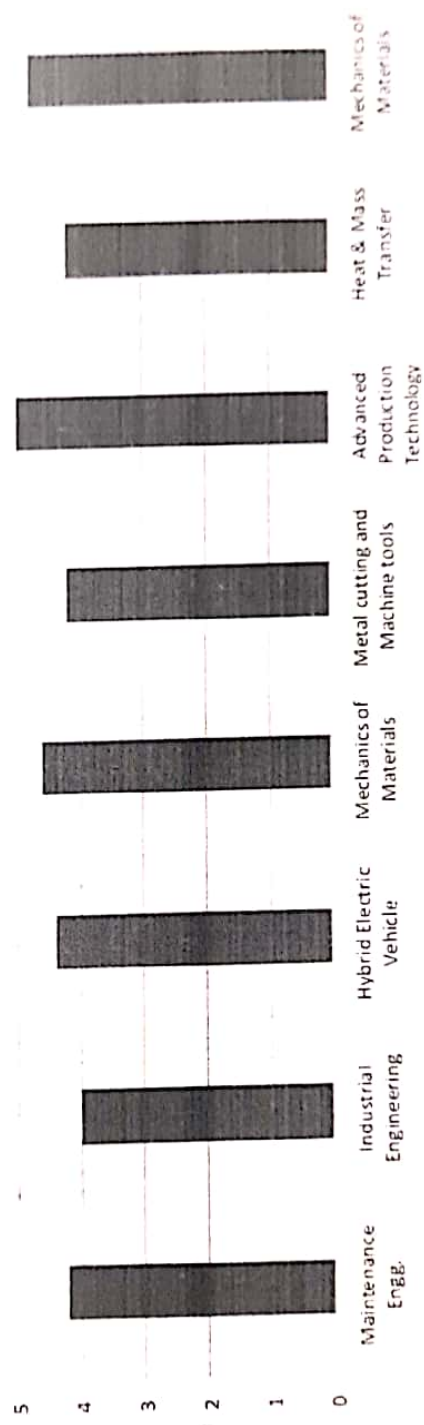
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
(Deemed to be University)
NAAC ACCREDITED WITH A++ GRADE

Teacher's Feedback on Curriculum

Action Taken on Teacher's Feedback

S.No.	Subject	Feedback	Action Taken
1	MOM	Needed improvement as per current need in the syllabus	Syllabus has been modified and introduced some advanced testing in BoS
2	Metal cutting and machine tools	New non-destructive techniques should be learn in this syllabus	It is subjected to the advanced machining processes subject to the NPTEL DE-Courses
3	Industrial Engineering	Numerical problem should be introduced related to industrial problems	This implementation will be done in upcoming BoS meeting

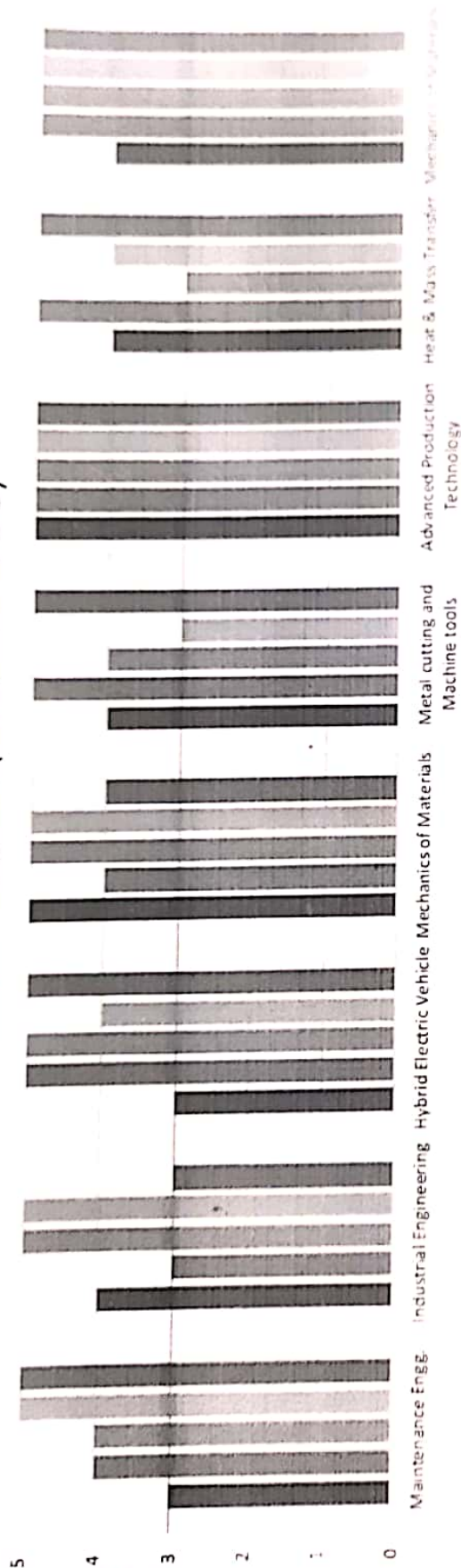
Overall Rating





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Teacher Feedback (on a scale of 1-5)



- The availability of books & E-learning material in the institute is good
- The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes
- The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends
- The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.
- The curriculum is capable of inculcating life-long learning abilities in students.

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Course Name	The availability of books & E-learning material in the institute is good	The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	The course curriculum/syllabi are helpful in meeting the higher studies/placements requirements according to present global trends.	The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	The curriculum is capable of inculcating life-long learning abilities in students.	Overall Rating
Maintenance Engg.	3	4	4	5	5	4.2
Industrial Engineering	4	3	5	5	3	4
Hybrid Electric Vehicle	3	5	5	4	5	4.4
Mechanics of Materials	5	4	5	5	4	4.6
Metal cutting and Machine tools	4	5	4	3	5	4.2
Advanced Production Technology	5	5	5	5	5	5
Heat & Mass Transfer	4	5	3	4	5	4.2
Mechanics of Materials	4	5	5	5	5	4.8

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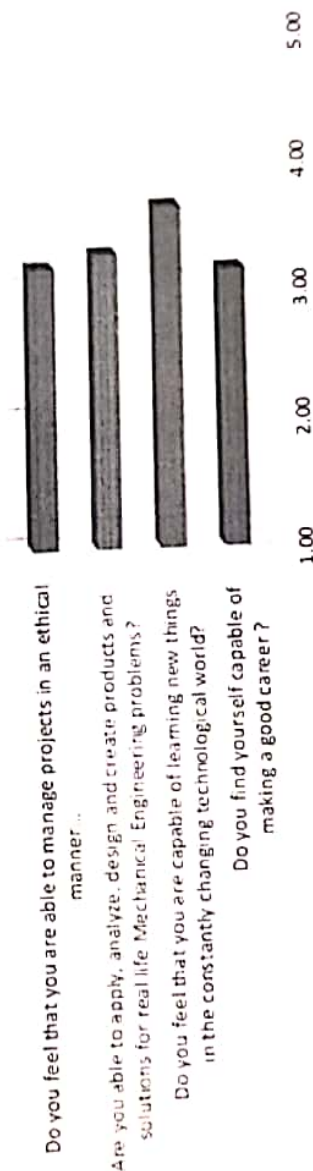
Alumni's Feedback on Curriculum

Action Taken on Alumni's Feedback

The feedback responses from alumni and action taken is illustrated in the following table:

S.No	Feedback	Action Taken
1	Industrial need should be fulfilled by employing subject related to industries	Internship in industry is offered in Mechanical VIII semester
2	MATLAB, Ansys, and simulation tool required	Curriculum updated, DE and OCs subjects are available for such courses.
3	Students must be more flexible in co-curricular activities along with curriculum	New clubs has been started in different domain of interest to develop students personalities..
4	Practical exposure is very less. Collage not provide any campus recruitment or internship opportunity.	6 month Internship opportunity is providing in VIII sem.

Average Feedback out of 5



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Do you find yourself capable of making a good career?	3.13
Do you feel that you are capable of learning new things in the constantly changing technological world?	3.47
Are you able to apply, analyze, design and create products and solutions for real life Mechanical Engineering problems?	3.03
Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member/leader of multidisciplinary teams?	3.03

Employer Feedback

Employer Feedback

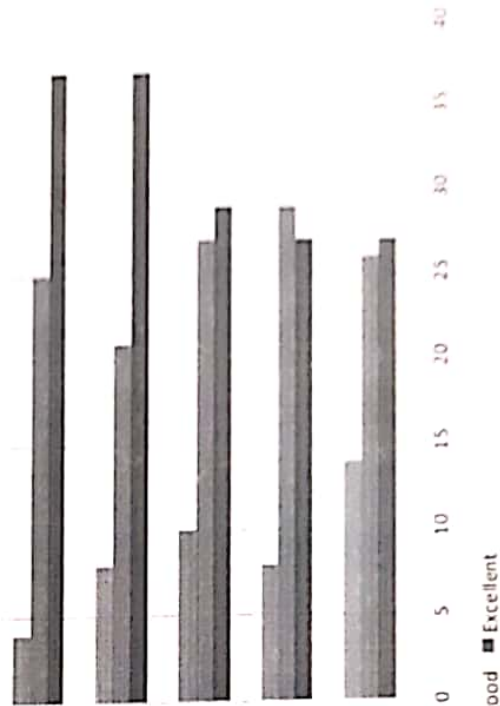
Please characterize the accomplishments of graduates from MITS Gwalior in your company, focusing on their few years performance after graduation
[Demonstrated ability to work well in a team]

Please characterize the accomplishments of graduates from MITS Gwalior in your company, focusing on their few years performance after graduation
[Level of ethical and social responsibility]

Please characterize the accomplishments of graduates from MITS Gwalior in your company, focusing on their few years performance after graduation
[Have they been deserved for elevation to higher level?]

Please characterize the accomplishments of graduates from MITS Gwalior in your company, focusing on their few years performance after graduation
[Level of success in learning new areas, engaging in professional...]

Please characterize the accomplishments of graduates from MITS Gwalior in your company, focusing on their few years performance after graduation
[Level of technical contribution]



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