

**MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR**  
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)  
**Department of Mechanical Engineering**

**Summary of Board of studies (ME/AU) meeting held on 08/06/2021**

**Detail of program/courses where syllabus revision was carried out**

<b>Course/ Subject Name</b>	<b>Code</b>	<b>Year/date of introduction</b>	<b>Year/date of revision</b>	<b>Percentage of content added or replaced</b>	<b>Item no.</b>	<b>Page. No.</b>
Fluid Mechanics and Hydraulic Machines	120314/190314	2015	08/06/2021	10%	7	6-8



**Dr. M. K. Gaur**

**HMED**

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**Department of Mechanical Engineering**

**MINUTES OF MEETING OF BOARD OF STUDIES (BoS)**

An online meeting of following members (external and internal) was held on 8<sup>th</sup> June, 2021 at 11:00 AM through online mode (Google Mee: Link <https://meet.google.com/ybo-bxdb-cwz>).

Following members were present:

- |      |                         |  |
|------|-------------------------|--|
| (1)  | Dr. M.K. Gaur           | Head of the Department and Chairman of the Committee     |
| (2)  | Prof. A.K. Agrawal      | Professor, IIT BHU, AC Nominee                           |
| (3)  | Dr. K. K. Jain          | Professor, NITTR, Bhopal, AC Nominee                     |
| (4)  | Dr. Prashant Kumar Jain | Associate Professor, IITDM, Jabalpur, RGPV Nominee       |
| (5)  | Dr. Pavan Kumar Kankar  | Associate Professor, IIT, Indore, AC Nominee             |
| (6)  | Er. Rajiv Singh Bais    | Chief Manager R&D, Siemens Ltd. Gurgaon, Industry Expert |
| (7)  | Dr. Pratesh Jayswal     | Member   |
| (8)  | Dr. Manish Ku. Sagar    | Member   |
| (9)  | Dr. C. S. Malvi         | Member   |
| (10) | Mr. R. P. Kori          | Member   |
| (11) | Mr. Vedansh Chaturvedi  | Member   |
| (12) | Dr. Jyoti Vimal         | Member   |
| (13) | Mr. Sharad Agrawal      | Member   |
| (14) | Mr. Vaibhav Shivhare    | Member   |
| (15) | Dr. Amit Aherwar        | Member   |
| (16) | Mr. Bhupendra K Pandey  | Member   |

Following members were absent:

- |     |                         |  |
|-----|-------------------------|--|
| (1) | Prof. P. M. V. Subbarao | Professor, IIT, Delhi                  |
| (2) | Mr. Rajesh Dixit        | Zonal Head, Yuken India Ltd. New Delhi |

The following agenda were discussed for UG (Mechanical and automobile engineering) and PG (Production Engineering and Product Design)

<b>Item ME1:</b>	To propose the list and syllabi for all <i>Departmental Elective (DE)</i> Courses of <i>VII Semester</i> under the flexible curriculum along with their Cos (Batch admitted in 2018-19)					
	<b>Mechanical Engineering</b>			<b>Automobile Engineering</b>		
	S.No.	Subject Code	Subject Name	S.No.	Subject Code	Subject Name
	1	120711	Refrigeration and Air-Conditioning	1	190711	Vehicle Dynamics
	2	120712	Basic of Finite Element Analysis	2	190712	Theory of Fuels and Lubricants
	3	120713	Metrology, Measurement and Control	3	190713	Hybrid Electric Vehicles
4	120714	Total Quality Management	4	190714	Two and Three-Wheeler Technology	
<b><u>ITEM ME 1a (Mechanical Engineering).docx</u></b>						
<b><u>ITEM ME 1b (Automobile Engineering).docx</u></b>						



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**Item ME2:**

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, to be offered in *online mode under Departmental Elective (DE) category*, for credit transfer in the *VII Semester (Batch admitted in 2018-19)*

Mechanical Engineering			Automobile Engineering		
S.No.	Subject Code	Subject Name	S.No.	Subject Code	Subject Name
1	120751	Foundation of Computational Fluid Dynamics	1	190751	Farm Machinery
2	120752	Introduction to Composites	2	190753	Introduction to Mechanical Vibration
3	120753	Advanced Machining Processes	3	190754	Industrial Safety Engineering
4	120754	Industrial Safety Engineering	4	190755	Introduction to Composites

ITEM ME 2a (Mechanical Engineering).docx  
ITEM ME 2b (Automobile engineering).docx

**Item ME3:**

To propose the list and syllabi for all *Open Category (OC) Courses of VII Semester* under the flexible curriculum along with their COs (*Batch admitted in 2018-19*)

Open Category (OC-2)			Open Category (OC-3)		
S.No.	Subject Code	Subject Name	S.No.	Subject Code	Subject Name
1	900203	Industrial Automation	1	900214	Engineering Materials for Industrial Applications
2	900204	Solar Energy	2	900215	Maintenance Engineering

ITEM ME 3.docx

**Item ME4:**

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

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

*[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the V semester (for the batch admitted in 2019-20) and for VII semester students (for the batch admitted in 2018-19)]*

Honours

Sem	V (For the batch admitted in 2019-20))	VII (For the Batch Admitted in 2018-19)
Course Name	1. Principle of Hydraulic Machines and System Design (8 Weeks) 2. System design for sustainability (12 Weeks) 3. Manufacturing Systems Technology Part I & II (12 Weeks)	1. Fundamentals of Artificial Intelligence (12 Weeks) 2. Rapid Manufacturing (12 Weeks) 3. Heat Exchangers: Fundamentals and Design Analysis (12 Weeks)

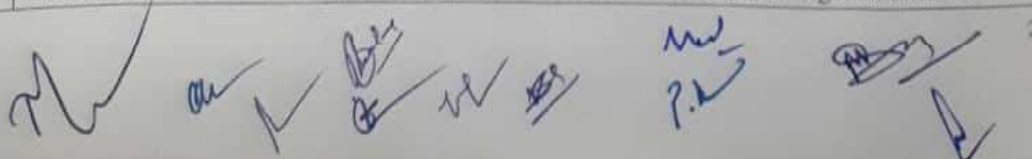
Minor Specialization

Sem	V (For the batch admitted in 2019-20))	VII (For the Batch Admitted in 2018-19)
Course Name	1. Basics of Materials Engineering (12 Weeks) 2. Fluid Mechanics (12 Weeks)	1. Engineering Metrology (12 Weeks) 2. Principle of Hydraulic Machines and System Design (8 Weeks)

ITEM ME 4.docx

**Item ME5:**

To review and update the syllabi for all *Departmental Core (DC) Courses of V & VII Semester* (for batches admitted in 2018-19 & 2019-20) under the flexible curriculum along with their COs



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Mechanical Engineering			Automobile Engineering		
S.No.	Subject Code	Subject Name	S.No.	Subject Code	Subject Name
1	120501	Industrial Engineering (DC-8)	1	190501	Industrial Engineering (DC-8)
2	120502	Metal Cutting and Machine Tools (DC-9)	2	190502	Metal Cutting and Machine Tool (DC-9)
3	120503	Heat and Mass Transfer (DC-10)	3	190503	Heat and Mass Transfer (DC-10)
4	120504	Thermal Engineering (DC-11)	4	190504	Design of Machine Elements (DC-11)
5	120505	Machine Design (DC-12)	5	190505	Automotive Chassis (DC-12)

ITEM ME 5a (Mechanical Engineering).docx

ITEM ME 5b (Automobile engineering).docx

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform for *Seminar/Self Study Courses* in V Semester (Batch admitted in 2019-20)

S.No.	Course Name	Duration	Start date	End date	Enrollment End date
1	Product Design and Development	4 Weeks	July 26, 2021	August 20, 2021	August 02, 2021
2	Foundations of Cognitive Robotics	4 Weeks	July 26, 2021	August 20, 2021	August 02, 2021
3	Principles of Vibration Control	4 Weeks	July 26, 2021	August 20, 2021	August 02, 2021
4	Polymer Assisted Abrasive Finishing Processes	4 Weeks	July 26, 2021	August 20, 2021	August 02, 2021
5	R&D Product Design	4 Weeks	July 26, 2021	August 20, 2021	August 02, 2021

ITEM ME 6.docx

**Item ME7:** *Scheme & Syllabi (along with the Course Outcomes) of III & IV semester of the B.Tech. students of 2020-21 admitted batch according to the revised structure*

ITEM ME 7a (Mechanical Engineering).docx

ITEM ME 7b (Automobile Engineering).docx

**Item ME8:** To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in V and VII semester (Batches admitted in 2018-19& 2019-2020)

ITEM ME 8.docx

**Item ME9:** To propose a suggestive list of projects which can be assigned under the "Skill based mini-project" category in various laboratory courses to be offered in July-December 2021.

ITEM ME 9.docx

**Item ME10:** To review the CO attainments for July-December 2020 semester, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels.

ITEM ME 10 & 12 (Course Outcomes Attainment).docx

**Item ME11:** To review curricula feedback from various stakeholders, its analysis and impact

ITEM ME 11.docx

**Item ME12:** To review course outcomes (COs) feedback of various courses, its analysis and impact

Attached in ITEM ME 10

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<b>Item ME13:</b>	<p>To present matters, if any, related to new curriculum/structure PG programme (Batch admitted in 2020-21) needing ratification in the forthcoming Academic Council meeting</p> <p>M.Tech, 2<sup>nd</sup> semester students opted Departmental Elective through Coursera online platform as the date of registration of course through NPTEL was not available for 2<sup>nd</sup> sem which was started from 12/04/2021.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>S. No.</th> <th>Name of Course</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Generative Design for Additive Manufacturing (DE-II)</td> </tr> <tr> <td>2</td> <td>Introduction to Operations Management (OC-II)</td> </tr> </tbody> </table> <p style="text-align: center;"><u>ITEM ME 13.docx</u></p>	S. No.	Name of Course	1	Generative Design for Additive Manufacturing (DE-II)	2	Introduction to Operations Management (OC-II)
S. No.	Name of Course						
1	Generative Design for Additive Manufacturing (DE-II)						
2	Introduction to Operations Management (OC-II)						
<b>Item ME14:</b>	<p>Any other department specific matter(s) (Scheme for 2021-22 admitted batch)</p> <p><u>ITEM ME 14a (Mechanical Engineering).docx</u></p> <p><u>ITEM ME 14b (Automobile Engineering).docx</u></p>						

Apart from the above points, the following points were discussed/Suggested in meeting:

1. Scheme of I to IV semester for 2020-21 admitted batch is prepared for (ME and AU) as per the suggestive scheme structure of the institute with teaching mode and exam mode.
2. There is minor change in the scheme of 2020-21, two subjects are interchanged and Basic Computer Engineering will be offered in I Sem and Engineering Chemistry in II Sem, this minor change in the scheme will be applicable for 2021-22 admitted batch.
3. Course objectives/ Course Outcomes of solar energy (OC) in VII Sem modified as per expert suggestions.
4. In Industrial Engineering (120501/190501) V Sem, Unit V should be taught before unit III so necessary modification requires in syllabus structure.
5. In self-study/Seminar offered through NPTEL/SWAYAM, there will be group discussion of students in every fortnight.
6. Cyber physical systems may be introduced as departmental elective (DE) for 2020-21 admitted batch.
7. In Machine Design (120505) the topic name in skill based mini project is modified as per suggested by experts.
8. Two experiments of Mass transfer are added in laboratory of Heat and Mass Transfer in fifth semester (120503/190503).
9. Maintenance Management will run as departmental core subject and Production and Operation Management will run as a departmental elective in M.Tech, I Semester.

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10. As per BoS experts suggestions, some portion of turbine is added in unit V of Fluid Mechanics and Hydraulic Machine (120314/190314) also Unit V (Air Standard Cycle) is added as unit V in Engineering thermodynamics (120414/190413) for 2020-21 admitted batch.

It is decided that, suggestions may be incorporated as it is or with some modifications as per applicability in the syllabus or scheme at the time of finalization in academic council.

The meeting was ended with vote of thanks to the chairperson and committee members.

  
Mr. B. K. Pandey  
(BoS Member)

  
Dr. Ankit 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. P. Kori  
(BoS Member)

  
Dr. C. S. Malvi  
(BoS Member)

  
Dr. M. K. Sagar  
(BoS Member)


  
Dr. Pratesh Jayaswal  
(BoS Member)

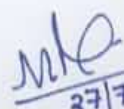
on line Present  
Er. Rajiv Singh Bais  
(Industry Expert)

on line Present  
Dr. Prashant K. Jain  
( RGPV Nominee)

online Present  
Dr. K K Jain  
(AC, Nominee)

online Present  
Prof. A.K. Agrawal  
(AC Nominee)

  
Dr. M. K. Gaur  
(BoS Chairman)

  
27/7/2021  
DEAN (ACADEMICS)  
M.I.T.S  
GWALIOR

**For batches admitted in Academic Session 2020-21**

**Fluid Mechanics and Hydraulic Machines**

Category	Title	Code	Credit-4			Theory Paper
Departmental Core-DC	Fluid Mechanics Hydraulic Machines	120314/190314	L	T	P	Max.Marks-50 Min.Marks-16 Duration-3hrs.
			2	1	2	

**Course Objectives:** To make the students understand:

1. Fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
2. And give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.
3. And develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow.

**Course Pre-Requisite:**

Basic Mechanical Engineering.

**Syllabus**

**Unit-I Properties of fluid:** Pressure, density, specific weight, viscosity, dynamic and kinematic viscosity Newton’s law of viscosity and its applications.

**Fluid Static:** Pressure variation with depth, pressure measurement, pressure on immersed surface centre pressure, Buoyancy, flotation, stability of floating bodies.

**Unit-II Fluid Kinetics:** One dimensional flow approximation, control volumes concept, continuity equation in 3-D, its differential and integral form, velocity and acceleration of fluid particle, stream line, path line. Rotation, vorticity and circulation. Stream function and velocity potential function. Flow net, Free and forced vortex flow.

**Unit-III Fluid Dynamics:** Momentum theorem, Impulse momentum equation and its application, Euler’s equation in 3-D, Bernoulli’s equation for incompressible fluid flow, engineering applications of energy equation, Pitot -Tube, Venturi meter, Orifice meter.

**Unit-IV Flow through Pipes:** Critical Reynolds’s number, velocity distribution in pipes, friction factor. Moody’s chart, Laminar flow through pipe, Hagen-Poiseulli’s equation, Turbulent flow through pipe, Hydraulic gradient line and total energy line. Minor head losses in pipes, Pipe Networking and Transmission of power through pipes.

*M. S. ... P.K. ...*

**Unit-V Water Turbine and Pump:** Impulse and Reaction principles, Pelton, Francis and Kaplan turbines, velocity diagrams, Work done by turbines, Draft Tube theory. Application of dimensional analysis, similarity to turbines and pumps, Classification, advantage over reciprocation type, definition of manometric head gross head, static head, vector diagram and work done. Performance and Characteristics of turbines and pumps. (Added)

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

- CO1: **Define** the fundamental properties of fluids.
- CO2: **Relate** the concepts of mechanics with various laws of fluid mechanics.
- CO3: **Identify** the laws of fluid mechanics applicable for the body in various fluids under different conditions.
- CO4: **Analyse** various forces and their effects, related to fluids mechanics.
- CO5: **Measure** and compare losses in different fluid flow conditions.
- CO6: **Compare** different turbo machines depending on their behaviour and their merits and demerits

#### **Text & Reference Books:**

1. Fluid Mechanics by Streeter & Wylis; McGraw-Hills Pub.
2. Fluid Mechanics by Modi & Seth; Standard publishing house.
3. Fluid Mechanics by D.S. Kumar ;Katson publisher.
4. Fluid Mechanics by R.K. Bansal; Laxmi Publishing House.
5. Fluid Mechanics by Yunus A Cengel & John M. Cimbala; Tata McGraw Hill Edition.

#### **NPTEL Link for Fluid Mechanics and Hydraulic Machines**

<http://nptel.ac.in/courses/112105171/1>

#### **List of Experiments:**

1. To find out coefficient of discharge of a given Venturimeter.
2. To determine the hydraulic coefficient  $C_v$ ,  $C_c$ , and  $C_d$  of an Orifice
3. To study the flow over a Rectangular notch to find the coefficient of discharge for it.
4. To determine the coefficient of friction for pipes of different sizes.

*M - S. M. A. R. P. K. M. S. D. S. S.*



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5. Experimental determination of Metacentric height of a ship model
6. Study of Redwood viscometer.
7. To study of different types of flow (Reynold's experiment).
8. To verify Bernoulli's Equation Experimentally.
9. To study the performance characteristics of a centrifugal pump and to determine the characteristic with maximum efficiency.
10. To conduct load test on Pelton Wheel Turbine and to study the characteristics of Pelton wheel turbine.
11. To conduct load test on Francis turbine and to study the characteristics of Francis turbine.
12. To study the characteristics of a Kaplan turbine.
13. To study the performance characteristics of a reciprocating pump and to determine the characteristic with maximum efficiency

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

- CO1: Conduct** experiment with flow measurement devices like Venturi meter and orifice meter.
- CO2: Estimate** the friction and measure the frictional losses in fluid flow.
- CO3: Predict** the coefficient of discharge for flow through pipes.
- CO4: Evaluate** pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe.
- CO5: Calculate** the Critical Reynolds's Number through Pipe Set Apparatus.
- CO6: Apply** thermodynamic concepts to analyze Fluid machines.

*M - S M A R P. K. N. D. J.*