

Shri G. S. Institute of Technology & Science, Indore

Department of Mechanical Engineering

Date: 12thFeb, 2024

Minutes of BOS Meeting held on 12th Feb 2024

A Board of Studies (BOS) meeting of Mechanical Engineering was held in hybrid (both offline & online) mode on 12th Feb 2024 for reviewing the course structure and syllabus of UG and PG courses of the department.

Following members have attended the meeting:

- | | |
|--|-----------------|
| 1. Dr. Sudhir Tiwari, Professor, Department of Mechanical Engineering, SGSITS, Indore | Chairman |
| 2. Dr. B. K. Gandhi, Professor, Department of Mechanical Engineering, IIT Roorkee | Expert Member |
| 3. Dr. S.V. Modak, Professor, Department of Mechanical Engineering, IIT-Delhi | Expert Member |
| 4. Dr. Ashesh Tiwari, Professor, Department of Mechanical Engineering, IET DAVV Indore | Expert Member |
| 5. Dr. Pavan Kumar Kankar, Associate Professor, IIT-Indore | Expert Member |
| 6. Shri. Vidyadhar Pande, Director, ABHIKALP Design Studio, Indore | Industry Expert |
| 7. Dr. M. L. Jain | Member |
| 8. Dr. Rajkumar Porwal | Member |
| 9. Dr. Basant Agrawal | Member |
| 10. Dr. B. R. Rawal | Member |
| 11. Dr. Vinod Pare | Member |
| 12. Dr. Bhupendra Singh More | Member |
| 13. Dr. Manoj Chouksey | Member |
| 14. Smt. Swati Chaugaonkar | Member |
| 15. Dr. Prabnesh Ganai | Member |
| 16. Dr. Ashok Atulkar | Member |
| 17. Shri. Dinesh Pasi | Member |
| 18. Shri. Vinod Parashar | Member |
| 19. Shri. Ravi Jatola | Member |
| 20. Shri Anil Mulewa | Member |
| 21. Shri. Gangaram Mourya | Member |

Meeting could not be attended by

1. Dr. Smita Manepatil



The deliberations of the meeting are as under:

Item no.1 – Scheme of B. Tech course of the department.

The committee reviewed the scheme of B Tech course and proposed the following;

1. In IV sem, Advance Electronics is proposed to be replaced with another subject from V sem Measurement and Control Systems. In V sem Mechatronic and Automation will be a regular subject.
2. Industrial training/ internship done by the students after IV Sem, is proposed be evaluated in V Sem in place of VI Sem.
3. It is proposed to introduce Minor project in VI sem.
4. Subject 'Essence of Indian Knowledge Tradition' is proposed to be in IV Sem, in place of sem VI.
5. It is proposed to introduce subject 'Environmental Science' in V Sem.
6. It is proposed to reshuffle of Elective subjects in IV Year as Finite Element methods and Computational Fluid Dynamics from Elective-III and Elective-IV to Elective I.
7. It is also proposed that if any student not getting internship or industrial training shall be permitted to take NPTEL online course of equal credit.
8. It was also recommended to offer online courses to prefinal year students as per Institute policy for online courses and transfer of credits.
9. The committee recommended following NPTEL courses for B.Tech IV Students for Jan –June 2024 session.
 - i. Experimental stress analysis noc24-me04 12 weeks
 - ii. Robotics: Basic and selected advanced concepts noc24-me23 12 weeks
 - iii. CFD for incompressible flow noc24-me26 12 weeks
 - iv. Mechanics of fiber reinforced polymer composite structure noc24-me49 12 weeks

All modifications from point no 1-8 are proposed to be implemented for 2023-24 admitted students. Revised scheme attached.

Item no 2- Exit Policy for B. Tech course as per NEP2020.

The DPAQIC recommended exit policy that students can pursue if they wish to leave program after 1st, 2nd, or 3rd year as per new education policy 2020.

- (i) After completion of first year to get certificate in a discipline/ field, students have to earn 10 credits by completion of following
 - (a) One course with lab of 4 credits from as per given list.
 - (b) One job specific internship/ apprenticeship of 6 credits in the relevant domain.
- (ii) After completion of second year to get under graduate diploma, students have to earn 10 credits by completion of following
 - (i) One course with lab of 4 credits from as per given list.
 - (ii) One job specific internship/ apprenticeship of 6 credits in the relevant domain.
- (iii) After completion of third year to get Bachelor of vocational Education (B. Voc.) in Mechanical Engg, students have to earn 10 credits by completion of following
 - (i) One course with lab of 4 credits from as per given list.
 - (ii) One job specific internship/ apprenticeship of 6 credits in the relevant domain.



Following areas suggested to complete course and industrial training:

After Ist Year	After IInd year	After IIIrd year
Machine Drawing and Computer graphics Manufacturing Process	Refrigeration and Air Conditioning Automobile Engg	Computer Aided Design Robotics Finite Element Methods

Item no. 3 Mission statement of the department

As per recommendation of DPAQIC the mission statement of the department is proposed to modified as:

Revised Mission statement is proposed to be as

M1- To provide state of the art education to students of Mechanical Engineering

M2- To enable the students to cater the needs of society and industries

M3- To excel in research and development activities in Mechanical Engg

Previous Mission statement of the department

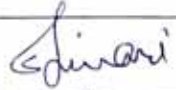



To develop adequate capabilities for imparting state of the art education in Mechanical Engineering, enabling the students to take up challenges and cater to the needs of person and industry engaged in academics, applied research and development activities related to Mechanical Engineering

Item no. 4 Any other item


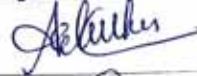
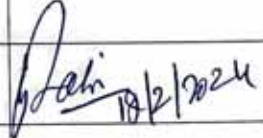


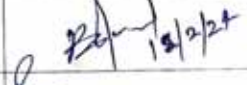



The experts suggested the following:

1. The institute shall try for implementation of relative grading in favour of students.
2. Finite Element Method shall a regular subject, presently it is an elective subject.
3. Electric Vehicle technology shall be included in the scheme.
4. CAD should be included in first year Engg Graphics practical component or in II year mechanical scheme to help students in industrial training/ internship/ projects.
5. The subject Economic for Engg may be shifted to III Yr.
6. The subject Design Thinking may include in the scheme of II Year.

The meeting ended with a vote of thanks to the chair.

1.	Dr. Sudhir Tiwari		11.	Dr. Vinod Pare	
2.	Dr. B.K. Gandhi	Joined online	12.	Dr. Bhupendra Singh More	
3.	Dr. S.V. Modak	Joined online	13.	Dr. Manoj Chouksey	
4.	Dr. Ashesh Tiwari		14.	Smt. Swati Chaugaonkar	



5.	Dr. Pavan Kumar Kankar		15.	Dr. Prabnesh Ganai	
6.	Shri. Vidyadhar Pande		16.	Dr. Ashok Atulkar	
7.	Dr. M. L. Jain		17.	Mr. Dinesh Pasi	
8.	Dr. Rajkumar Porwal		18.	Mr. Vinod Parashar	
9.	Dr. Basant Agrawal		19.	Shri. Ravi Jatola	
10.	Dr. B. R. Rawal		20.	Mr. Anil Mulewa	
			21.	Shri. Gangaram Mourya	



**1 YEAR B.Tech. (4YDC)
Common To All Branches**

Semester - A

S. No.	Subject Category	Subject Code	Subject Name	Hours per Week					Credits			Maximum Marks				
				L	T	P	Th	Pr	Th.	Theory		Practical		Total		
										CW	SW	SW	Pr.			
1	BSC	MA 10001	Mathematics - I	3	1	0	4	0	70	30	0	0	100			
2	BSC	PH10017	Physics	3	-	-	3	-	70	30	-	-	100			
3	ESC	EE10015	Fundamentals of Electrical Engineering	2	1	-	3	0	70	30	0	0	100			
4	ESC	CE10013	Fundamentals of Civil Engineering & Applied Mechanics	2	1	-	3	0	70	30	0	0	100			
5	ESC	ME10049	Engineering Graphics	2	-	-	2	-	70	30	-	-	100			
6	BSC (LC)	PH10151	Applied Physics Lab	-	-	2	-	1	-	-	20	30	50			
7	ESC (LC)	EE10152	Electrical Engineering Lab	-	-	2	-	1	-	-	20	30	50			
8	ESC (LC)	ME10153	Engineering Graphics Lab	-	-	4	-	2	-	-	40	60	100			
9	HSMC	HU10191	Extra /Co curricular Activity	-	-	2	-	1	-	-	50	0	50			
10	MC		Induction program & Universal Human Values	2-3 weeks in the beginning of 1 Year & 1 hour per week during semester												
TOTAL				12	3	10	15	5	350	150	130	120	750			






I year		Semester - B												
S. No.	Subject Category	Subject Code	Subject Name	Hours per Week				Credits		Maximum Marks				
				L	T	P	Th	Pr	Th.	C W	S W	Pr.	Total	
1	BSC	MA 10501	Mathematics – II	3	1	-	4	-	-	70	30	0	0	100
2	BSC	CH10516	Chemistry	3	-	-	3	-	-	70	30	-	-	100
3	HSMC	HU10551	Technical English	2	-	-	2	-	-	70	30	0	0	100
4	ESC	CO10507	Programming for Problem Solving	2	1	-	3	-	-	70	30	0	0	100
5	ESC	EC10508	Basic Electronics Engineering	2	-	-	2	-	-	70	30	0	0	100
6	BSC (LC)	CH10656	Chemistry Lab	-	-	2	-	1	-	-	-	20	30	50
7	HSMC (LC)	HU10653	Language Lab	-	-	2	-	1	-	-	-	20	30	50
8	ESC (LC)	CO10654	Computer Programming Lab	-	-	2	-	1	-	-	-	20	30	50
9	ESC (LC)	IP10655	Manufacturing Practices	-	-	4	-	2	-	-	-	40	60	100
10	HSMC	HU10691	Extra /Co curricular Activity	-	-	2	-	1	-	-	-	50	-	50
11	MC		Induction program & Universal Human Values	2-3 weeks in the beginning of 1 Year & 1 hour per week during semester										
TOTAL				12	2	12	14	6	350	150	150	150	150	800

Engineering Certificate shall be awarded after acquiring additional 10 credits out of which 6 credits as 2 Months industrial training within five years

II B.TECH.(4YDC) MECHANICAL ENGINEERING

Semester: III

S.No.	Subject Category	Subject Code	Subject	Hours per Week			Th. Credit	Pr. Credit	Maximum Marks			Total	
				L	T	P			Th.	CW	SW		Pr.
1	PCC	ME26011	Fluid Mechanics	3	-	2	3	1	70	30	40	60	200
2	PCC	ME26002	Strength of Materials	3	-	2	3	1	70	30	40	60	200
3	BSC	MA26004	Mathematics -III	3	1	-	4	-	70	30	-	-	100
4	PCC	ME26008	Material Science	3	-	2	3	1	70	30	40	60	200
5	PCC	ME26005	Engineering Thermodynamics	3	-	2	3	1	70	30	40	60	200
6	HSMC	HU26481	Values, Humanity and Professional Ethics	-	2	-	2	-	-	100	-	-	100
7	MC	HUM2001	Constitution of India*	2	-	-	-	-	-	50	-	-	50
Total				17	3	8	18	4	350	300	160	240	1050

Semester: IV

S.No.	Subject Category	Subject Code	Subject	Hours per Week			Th. Credit	Pr. Credit	Maximum Marks			Total	
				L	T	P			Th.	CW	SW		Pr.
1	BSC	MA26556	Mathematics-IV	3	1	-	4	-	70	30	-	-	100
2	PCC	ME26551	Machine Design - I	3	-	2	3	1	70	30	40	60	200
3	PCC	ME26562	Kinematics of Machine	3	-	2	3	1	70	30	40	60	200
4	ESC	ME	Measurement & Control Systems	3	-	2	3	1	70	30	40	60	200
5	PCC	IP26553	Manufacturing Processes - I	3	-	2	3	1	70	30	40	60	200
6	HSMC	HU26507	Economics for Engineers	3	-	-	3	-	70	30	-	-	100
7	PCC	ME26881	Machine Drawing & Computer Graphics	-	-	2	-	1	-	-	40	60	100
8	MC	HUM	Essence of Indian Knowledge Tradition	2	-	-	-	-	-	50	-	-	50
Total				20	1	10	19	5	420	180	200	300	1150

Internship of minimum 02 weeks between semester IV & semester V. To be evaluated in Sem V.

* Non Credit Mandatory Subject.

III B.E.(4YDC) MECHANICAL ENGINEERING

SEMESTER - V

S.No.	Subject Category	Subject Code	Subject	Hours per Week			Th. Credit	Pr. Credit	Maximum Marks					
				L	T	P			Th.	CW	SW	Pr.	Total	
1	PCC	ME36011	Dynamics of Machines	3	1	2	4	1	70	30	40	60	200	
2	PCC	ME	Mechatronics and Automation	3	-	2	3	1	70	30	40	60	200	
3	PCC	ME36006	Heat & Mass Transfer	3	-	2	3	1	70	30	40	60	200	
4	PCC	ME36007	Steam and Gas Power System	3	-	-	3	-	70	30	-	-	100	
5	PCC	IP36062	Manufacturing Processes-II	3	-	2	3	1	70	30	40	60	200	
6			Evaluation of Industrial Training/ Internship	-	-	4	-	2	-	-	100	-	100	
7	MC	ME	Environmental Sciences	2						50			50	
				TOTAL	17	1	12	16	6	350	200	260	240	1050

SEMESTER - VI

S.No.	Subject Category	Subject Code	Subject	Hours per Week			Th. Credit	Pr. Credit	Maximum Marks					
				L	T	P			Th.	CW	SW	Pr.	Total	
1	PCC	ME36501	Refrigeration and Air conditioning	3	-	2	3	1	70	30	40	60	200	
2	PCC	ME36503	Machine Design – II	3	-	4	3	2	70	30	40	60	200	
3	PCC	ME36506	Fluid Machinery	3	-	2	3	1	70	30	40	60	200	
4	PEC	ME36509	Internal Combustion Engines	3	-	2	3	1	70	30	40	60	200	
5	HSMC	IP36504	Industrial Engineering and Production Management	3	-	-	3	-	70	30	-	-	100	
6	PROJ		Minor Project	-	-	4	-	2	-	-	100	-	100	
				Total	15	0	14	15	7	350	150	260	240	1000

Internship of minimum 02 weeks between semester VI & semester VII. To be evaluated in Sem VII.

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IV B.Tech.(4YDC) MECHANICAL ENGINEERING

SEMESTER - VII

S.No.	Subject Category	Subject Code	Subject	Hours per Week			Th. Credit	Pr. Credit	Maximum Marks				
				L	T	P			Th.	CW	SW	Pr.	Total
1	PEC	ME46018	Automobile Engineering	3	-	2	3	1	70	30	40	60	200
2	PEC	ME46051	Vibration and Noise Control	3	-	2	3	1	70	30	40	60	200
3	PEC	ME46020	Computer Aided Design	3	-	2	3	1	70	30	40	60	200
4	PEC		Elective-I	3	-	-	3	-	70	30	-	-	100
5	PEC		Elective-II	3	-	-	3	-	70	30	-	-	100
	PROJ	ME46481	Evaluation of Industrial Training/ Internship	-	-	-	-	2	-	-	100	-	100
7	PROJ	ME46498	Major Project Phase-I (AB group)	-	-	6	-	3	-	-	40	60	100
8	PROJ	ME46998	Major Project Phase-II (BA Group)	-	-	8	-	4	-	-	60	90	150
Total				15	0	12	15	8	350	150	260	240	1000
				15	0	14	15	9	350	150	280	270	1050

SEMESTER - VIII

S.No.	Subject Category	Subject Code	Subject	Hours per Week			Th. Credit	Pr. Credit	Maximum Marks				
				L	T	P			Th.	CW	SW	Pr.	Total
1	PEC		Elective III	3	-	-	3	-	70	30	-	-	100
2	PEC		Elective IV	3	-	-	3	-	70	30	-	-	100
3	PROJ	ME46882	Industrial Training/Internship	-	-	-	-	4	-	-	100	-	100
4	PROJ	ME46998	Major Project Phase- II (AB Group)	-	-	8	-	4	-	-	60	90	150
5	PROJ	ME46498	Major Project Phase-I (BA group)	-	-	6	-	3	-	-	40	60	100
Total				6	0	8	6	8	140	60	160	90	450
				6	0	6	6	7	140	60	140	60	400



IV B.Tech.(4YDC) MECHANICAL ENGINEERING
List of Electives

Elective-I			SEMESTER - VII	
S.No.	Subject Category	Subject Code	Subject	
1		ME	Finite Element Methods	
2		ME46219	Advanced Machine Design	
3			Computational Fluid Dynamics	
4			Design of Air Conditioning Equipment	
5			Computer Aided Manufacturing	

Elective-II			SEMESTER - VII	
S.No.	Subject Category	Subject Code	Subject	
1		IP46316	Operational Research	
2		ME46315	Hydraulic, Pneumatic & Fluidic Control	
3			Bio - Mechanics	
4			Industrial Tribology and Maintenance Engg	
5		ME46327	Data Science and Machine Learning	
6			Power Plant and Energy Management	

IV B.Tech.(4YDC) MECHANICAL ENGINEERING
List of Electives

Elective-III			SEMESTER - VIII	
S.No.	Subject Category	Subject Code	Subject	Subject
1		ME46667	Composite Materials	
2		ME46668	Renewable Energy Sources	
3		IP46669	Industrial Inspection & Quality Control	
4		ME	Robotics	
5			Rotor Dynamics	
6			Artificial Intelligence	
7				

Elective-IV			SEMESTER - VIII	
S.No.	Subject Category	Subject Code	Subject	Subject
1			Gas Dynamics & Fluid Flow	
2		ME46705	Engineering Optimization	
3		ME46704	Design of Thermal Systems	
4		ME46706	3D Printing and Design	
5			Viscous Fluid Flow	
6				

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Department of Mechanical Engineering

CODE	SUBJECT NAME	L	T	P	Credits			Maximum Marks				
					T	P	Total	Th.	CW	SW	Pr.	Total
ME 36***	Mechatronics and Automation	3	-	2	3	1	4	70	30	40	60	200

Pre-requisites: ME26***, ME 26562, EC 10508, EE 10015

Course Assessment:

The following methods are adopted for the assessment of this course;

1. **Class Work:** (30 marks) based on regular evaluation of assignments, two mid-semester tests, and class attendance.
2. **Sessional Work:** (40 marks) based on internal viva and continuous laboratory journal assessment and laboratory attendance.
3. **Practical Examination:** (60 Marks) based on evaluating practical knowledge, quiz and viva-voce.
4. **Theory Examination:** (70 Marks) based on end-term theory paper examination.

Course Outcomes:

CO's	Description
CO 1	Explain the concept of the control system.
CO 2	Design and analyze the performance of the various control systems.
CO 3	Illustrate the working and application of hydraulic and pneumatic systems.
CO 4	Classify Sensors and analyze motion control systems.
CO 5	Explain the signal conditioning and the data acquisition process.

Unit 1: Introduction of Mechatronics and mechatronics approaches, the introduction of the control system, element of the control system, control system design process, performance specification of the control system, Modelling in the frequency domain, and time response of control system.

Unit 2: Stability of Control System, Steady state error of control system, application of root locus method to design cascade compensators to improve the steady-state error, design cascade compensators to improve the transient response, design cascade compensators to improve both the steady-state error and the transient response, design feedback compensators to improve the transient response.

Unit 3: Electro-Mechanical Actuators: Electro-mechanical actuators, solenoids and relays, types of electric motors and their characteristics, electrical drives, and control of electric motors. Hydraulic & Pneumatic Systems: Hydraulic & Pneumatic cylinders and Actuators, Pressure and Flow Control Valves, Direction Control Valves, Basic circuit, Reference circuit, Meter-in, Meter-out and Bleed off circuit, Accumulator circuit, Circuit Diagram representation.

Unit 4: Motion Control: Trajectory planning, motion controllers, point-to-point motion, coordinated multi-axis motion, electronic gearing, Types of Sensors, Feedback devices: linear and rotary encoders, resolvers, tachometers, and tachogenerators.

Unit 5: Signal Conditioning & Data Acquisition: Amplification. Filters. Operational amplifier and its applications. Analog to digital conversion. Data acquisition. Introduction of microcontrollers interfacing with microcontroller and microprocessor.

References:

1. K. Ogata, Modern Control Theory, PHI, 2004
2. Nakra & Choudhary, Instrumentation, Measurement and Analysis, TMH, 2004
3. Bolton, Mechatronics, Pearson Education India, 2004
4. Norman S. Nice, Control System Engineering, John Wiley & Sons, Inc.

Department of Mechanical Engineering

CODE	SUBJECT NAME	L	T	P	Credits			Maximum Marks				Total
					T	P	Total	Th.	CW	SW	Pr.	
ME 26***	Measurement & Control System	3	-	2	3	1	4	70	30	40	60	200

Pre-requisites: ME26011, EC10508,

Course Assessment:

The following methods are adopted for the assessment of this course;

1. **Class Work:** (30 marks) based on regular evaluation of assignments, two mid-semester tests, and class attendance.
2. **Sessional Work:** (40 marks) based on internal viva and continuous laboratory journal assessment and laboratory attendance.
3. **Practical Examination:** (60 Marks) based on evaluating practical knowledge, quiz and viva-voce.
4. **Theory Examination:** (70 Marks) based on end-term theory paper examination.

Course Outcomes:

CO's	Description
CO1	Analyze measurement instruments, identify errors, and conduct uncertainty analysis
CO2	Utilize temperature and pressure velocity measurement techniques effectively
CO3	Design and implement strain and motion force torque measurement systems proficiently
CO4	Enhancement of analytical skills for mathematical modeling and understand control system concepts
CO5	Analyze system responses and apply stability criteria to control systems

COURSE CONTENTS

Unit 1 Basic Concepts of Measurement: General measurement system, Noise and interference, Calibration, Static Performance Characteristics of measuring instrument and measurement system, Sequential and random tests, Measurement errors, error sources: calibration, data acquisition, data reduction; Design stage uncertainty analysis; combining elemental errors, Bias & Precision errors; Error propagation, Higher order uncertainty analysis.

Unit 2 Temperature Measurements: Temperature standards, Temperature scales, Thermometry based on thermal expansion: Liquid in glass thermometers, Bimetallic Thermometers, Electrical resistance thermometry: Resistance Temperature Detectors, Thermistors; Thermoelectric Temperature Measurement: Temperature measurement with thermocouples; thermocouple standards. Pressure and Velocity Measurements: Relative pressure scales, pressure reference instruments: Pitot-static probe, manometer, deadweight tester, pressure gauges and transducers, total and static pressure measurement in moving fluid. Flow measurements: Pressure differential meters: Orifice meter, Venturi meter, rota-meter.

Unit 3 Strain Measurements: Stress and strain, resistance strain gauges, gauge factor, strain gauge electrical circuits, multiple gauge bridge, bridge constant, apparent strain and temperature compensation, bending compensation. Motion, Force and Torque Measurements: Displacement measurement: Potentiometers, Linear variable differential transformers, rotary variable differential transformer; Velocity measurement: moving coil transducers; angular velocity measurement: electromagnetic techniques, stroboscopic measurement; Force measurement: load cells, piezoelectric load cells; Torque measurement: measurement of torque on rotating shafts, Power estimation from rotational speed and torque.

Unit 4 Introduction to control systems: Examples of control systems, Open loop and closed loop control, Mathematical modeling of dynamic systems: Transfer function, impulse response function, block diagram of closed loop system, block diagram reduction, modeling of mechanical systems, modeling of electrical systems, signal flow graphs, modeling of fluid systems, liquid level systems, hydraulic systems, modeling of thermal systems.

Unit 5 Transient and steady-state response analyses: First order systems, unit step and unit impulse response of first order systems, second order systems, unit step, and unit impulse response of second order systems, transient response specifications, Routh Hurwitz stability criteria, Introduction to Bode plot and root locus method, System modeling using MATLAB.

Text Books:

1. Nakra B.C., Chaudhary K.K., Instrumentation, Measurement and Analysis, Tata McGraw Hill, New Delhi, 2004
2. Modern Control Engineering, 4e, Katsuhiko Ogata, Pearson Education, New Delhi, 2004

Reference Books:

1. Richard S. Figiola & Donal E. Beasley, Theory and Design for Mechanical Measurements, 5e, John Wiley, 2005
2. Gopal M., Control Systems Principles and Design, 2e, Tata McGraw Hill, New Delhi, 2006
3. Beckwith and Buck, Mechanical Measurements, Addison-Wesley Pub. Co., 1982