



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



Department of Mechatronics

Minutes of Fifth BoS Meeting

Venue

R&D Lab,
Mechanical Block
Sri Manakula Vinayagar Engineering College

Date & Time

24th September 2022
2:00 P.M.



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Department of Mechatronics

Minutes of Fifth Board of Studies Meeting

The Fifth Board of Studies meeting of Mechatronics Department was held on 24th September 2022 at 2:00 P.M in the R&D Lab, Sri Manakula Vinayagar Engineering College, with the Head of the Department in the Chair.

The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	Members as per UGC Norms
1	Dr. G. Balamuruga Mohan Raj Professor and Head Department of Mechatronics, SMVEC	Chairman
2	Dr.Shankar Krishnapillai, Professor, Indian Institute of Technology, Chennai – 600 036.	Subject Expert (University Nominee)
3	Dr.D.Dinakaran, Professor, Hindustan Institute of Tech. & Science, Chennai – 103	Subject Expert (Academic Council Nominee)
4	Dr.R.Parameshwaran, Professor, Kongu Engineering College, Erode – 638 606	Subject Expert (Academic Council Nominee)
5	Mr.P.Ramesh Managing Director, Switching Technologies Gunther Ltd., Tambaran, Chennai – 600045	Representative from Industry
6	Dr. A.G.Ganesh Kumar, M.E., Ph.D Professor/Mechanical	Internal Member
7	Prof. P. Ramesh Kumar, M.E, Assistant Professor/Mechatronics	Internal Member
8	Dr. R. Kurinjimalar, M.E., Ph.D., Associate Professor/ECE	Internal Member

9	Prof. Pushaparaj, M.E. Assistant Professor/ECE	Internal Member
10	Prof. N. Vijayan Assistant Professor / Mathematics	Internal Member
11	Dr. A. Rajappa Associate Professor / Chemistry	Internal Member
12	Dr. M. A. Ishrath Jahan Associate Professor / English	Internal Member
13	Dr. T. Sivaranjani Associate Professor / Physics	Internal Member

AGENDA OF THE MEETING

Item No. : BoS / UG / MCT 5.1

Welcome Address, Introduction about the Institution and Department

Item No. : BoS / UG / MCT 5.2

Curriculum Structure of B.Tech – Mechatronics

Item No. : BoS / UG / MCT 5.3

To discuss and approve the modifications in the Curriculum and syllabi for VI to VIII Semesters under R2020 Regulations for UG Programme: B.Tech. Mechatronics in the Academic Year 2022-23 for the students admitted in the year 2020-21

- ❖ Course structures
- ❖ Professional Core Courses
- ❖ Professional Elective Courses

Item No. : BoS / MCT 5.4

To discuss about the

- ❖ Innovative Teaching / Practices Methodology adopted to handle the emerging. / Advanced Technological concept courses
- ❖ List of Internal and External Examiners.

Item No. : BoS / MCT 5.5

Any other item with the permission of chair

Minutes of the Meeting

Dr. G. Balamuruga Mohan Raj, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal members and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

BOS/2022/MCT/UG/5.2:Chairman, BoS, appraised the minutes of forth BoS, its implementation and then it is confirmed with the approval for the incorporation.

BOS/2022/MCT/UG/5.3:Recommended to the Academic Council with following suggestions in the Curriculum and Syllabus of Regulation 2020.

Sl. No.	Regulations	Semester	Subject Name with Code	Unit	Particulars
1	R2020	VI	Fluid Power System U20MCT614	I, II & III	Few topics are modified
2	R2020	VI	Design of Mechanical Elements U20MCT616	I & III	Few topics are modified
3	R2020	VIII	Computer Aided Engineering Lab U20MCP713	-	Software names are generalized instead of specific software name and experiments are revised




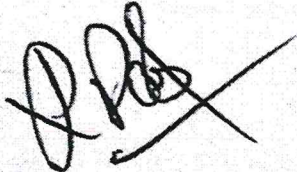


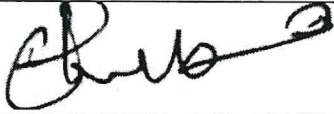

The above corrections are incorporated and the Syllabi (Given in Annexure I) are approved by the BoS members

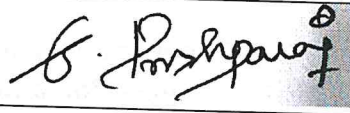


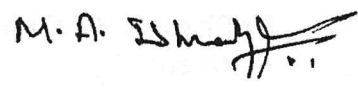

BOS/2022/MCT/UG/5.4: Innovative Teaching / Practices Methodology adopted to handle the emerging / Advanced Technological concept courses was discussed and appreciated.

The meeting was concluded with vote of thanks by Dr. G. Balamuruga Mohan Raj, Chairman, Board of Studies, Department of Mechatronics, Sri Manakula Vinayagar Engineering College.



Board Chairman
Dr. G. Balamuruga Mohan Raj
Professor and Head
Department of Mechatronics Engineering,

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	Dr. G. Balamuruga Mohan Raj Professor and Head Department of Mechatronics Engineering, SMVEC	Chairman	
External Members			
2	Dr.Shankar Krishnapillai, Professor, Indian Institute of Technology, Chennai – 600 036.	Pondicherry University Nominee	
3	Dr.D.Dinakaran, Professor, Hindustan Institute of Tech. & Science, Chennai – 103	Subject Expert	
4	Dr.R.Parameshwaran, Professor, Kongu Engineering College, Erode – 638 606	Subject Expert	
5	Mr.P.Ramesh Managing Director, Switching Technologies Gunther Ltd., Tambaran, Chennai – 600045	Industry Expert	
Internal Members			
6	Dr. A.G.Ganesh Kumar, M.E., Ph.D Professor	Member	
7	Prof. P. Ramesh Kumar, M.E, Assistant Professor	Member	
8	Dr. R. Kurinjimalar, M.E., Ph.D., Associate Professor	Member	

9	Prof. Pushaparaj, M.E. Assistant Professor	Member	
Co-opted Members			
10	Prof. N. Vijayan Assistant Professor / Mathematics	Member	
11	Dr. A. Rajappa Associate Professor / Chemistry	Member	
12	Dr. M. A. Ishrath Jahan Associate Professor / English	Member	
13	Dr. T. Sivaranjani Associate Professor / Physics	Member	

Annexure- I

U20MCT614

FLUID POWER SYSTEMS

L	T	P	C	Hrs
2	2	0	3	60

Course Objectives

- To understand the concepts, construction and working principles of fluid power system
- To recognize the construction and working of pumps and actuators for hydraulic system
- To identify the usage of various directional control valves in hydraulic systems
- To be aware of the performance of pneumatic systems
- To apply various methods to design and execute hydraulic and pneumatic systems.

Course Outcomes

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

CO1 - Illustrate the fundamentals of hydraulic systems and determine losses incurred in hydraulic circuit (K2)

CO2 - Experiment with the suitable pump and actuators for particular application.(K3)

CO3 - Make use of various hydraulic valves.(K3)

CO4 - Analyze various fundamentals of pneumatic systems. (K4)

CO5 - Develop hydraulic and pneumatic circuits for simple application (K5)

UNIT I FLUID POWER SYSTEMS

(12 Hrs)

Introduction to fluid power – Pascal's law – Components - Advantages – Drawbacks – Applications. Hydraulic fluids: Properties. Darcy's equation – Frictional losses – Losses in valves and fittings – Determination of head losses & pump power in a hydraulic circuit.

UNIT II HYDRAULIC PUMPS AND ACTUATORS

(12 Hrs)

Positive and Non-positive displacement pumps - Functions– Pump classification – Construction and working principle of Gear, Vane and Piston pumps.. Hydraulic cylinder (double acting) – Construction & Working principle – Double rod cylinder – Telescopic cylinder.

UNIT III HYDRAULIC VALVES

(12 Hrs)

Directional control valves: Check valve – Pilot operated check valve – 3/2 valves – 4/2 valves – methods of valve actuation – Shuttle valve. Pressure control valves: Pressure relief valves - Pressure reducing valve, Unloading valves, Counter balance valves - Flow control valves - Servo valves.

UNIT IV PNEUMATIC SYSTEMS

(12 Hrs)

Introduction – Properties of air – gas laws – Compressors: Piston compressor, Screw compressor and Vane compressor. Fluid conditioners: Air filters, Air pressure regulators, Air lubricators, Pneumatic silencers and Air dryers. Pneumatic actuators: Pneumatic cylinders, Rotary air motors – Performance curves.

UNIT V DESIGN OF HYDRAULIC AND PNEUMATIC CIRCUITS

(12 Hrs)

Sequential circuit design for simple applications: Step counter method, Cascade methods & Karnaugh Veitch map method – PLC circuit design using ladder logic.

Text Books

1. S. R. Majumdar, Oil Hydraulics, Tata McGraw Hill Publishing Company Pvt Ltd. New Delhi, 2014
2. James L. Johnson, Introduction to Fluid Power, Delmar Thomson Learning, 2013.
3. Patrick J. Klette "Fluid Power Systems" American Technical Publishers, Incorporated, 2014

Reference Books

1. Anthony Esposito, Fluid Power with Applications, Pearson Education New Delhi, 2015.
2. Md Faiyaz Ahmed "Fluid Power Control Systems" Lulu.com. – 2016.
3. Nicolae Vasiliu, Daniela Vasiliu, Constantin C?Linoiu" Simulation of Fluid Power Systems with Simcenter Amesim "CRS Press – 2018
4. Yaobao Yin "Electro Hydraulic Control Theory and Its Applications Under Extreme Environment" Butterworth-

Heinemann– 2019

5. P.K. Guha "Hydraulic Pumps & Motors and their Applications" Dog Ear Publishing. 2018

Web Resources

1. <https://nptel.ac.in/courses/112/104/112104117/>
2. <https://nptel.ac.in/courses/112/105/112105206/>
3. https://swayam.gov.in/nd1_noc20_me55/preview
4. https://www.youtube.com/watch?v=S_4anj7GpRo

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3
2	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3
3	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3
4	3	2	3	3	-	-	-	-	-	-	-	2	2	2	3
5	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3

Correlation Level: 1-Low, 2-Medium, 3- High



Dr. G. Balamuruga Mohan, M.Tech., Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

U20MCT616

DESIGN OF MECHANICAL ELEMENTS

L	T	P	C	Hrs
2	2	0	3	60

Course Objectives

- To familiarize the various steps involved in the design process.
- To design shafts, keys and couplings
- To plan gears and analyzing the influence of stresses on it
- To propose brakes and clutches for automobiles with appropriate assumptions
- To devise bearings and springs with appropriate assumptions

Course Outcomes

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

CO1 - Interpret the influence of steady and variable stresses in machine component design.(K2)

CO2 - Make use of concepts of shafts, keys and couplings with proper assumptions. (K3)

CO3 - Analyze of spur, helical, bevel, worm gear drives and multi speed gear box (K4)

CO4 - Function of clutches and braking systems (K4)

CO5 - Evaluate bearings and springs problems.(K5)

(12 Hrs)

UNIT I DESIGN FUNDAMENTALS

Design Process– Optimum design – Material Standards – Types of loads –Stresses – Static, varying, thermal, impact and residual. Factors of safety – Theories of failure – Stress concentration factors – S-N curves and its applications.

(12 Hrs)

UNIT II SHAFTS AND COUPLINGS

Design of Shafts, Keys and Couplings: Design of Solid and Hollow shafts – Based on strength, rigidity and deflection – Torsional rigidity – Lateral rigidity – Material constants. Design of Keys – Types – Keyways. Design of rigid and flexible couplings.

(12 Hrs)

UNIT III DESIGN OF SPUR AND HELICAL GEARS

Principles of gear tooth action – Gear correction – Gear Materials- Gear tooth failure modes. Design of spur and helical gears – Gear trains.

(12 Hrs)

UNIT IV DESIGN OF BRAKES AND CLUTCHES

Brakes – Types – Dynamic and thermal aspects of Braking – Braking system in automobiles. Design of clutches – Single plate – Multi plate –Conical clutch – Over running clutch.

(12 Hrs)

UNIT V DESIGN OF BEARINGS AND SPRINGS

Study of Bearings – Design of Bearings – Sliding contact –Rolling contact – Cubic mean load. Design of Journal Bearings – Calculation of Bearing dimensions – Springs - Design of Helical spring, Leaf springs – Types of springs – Wahl factor.

Text Books

1. Bhandari V.B., Design of Machine Elements, 4th edition, McGraw Hill Education India, 2017
2. Ganesh Babu K., K. Srithar, Design Of Machine Elements, 1st Edition, McGraw Hill, 2009
3. Spotts M.F., Shoup T.E., Hornberger L.E., Design of Machine Elements: 8th edition, Pearson /Prentice Hall, 2003

Reference Books

1. Hamrock B.J., Fundamentals of Machine Elements, 2nd edition, McGraw Hill, 2004
2. Juvinal R.C., K.M. Marshek, Fundamentals of machine component design: 6th edition, John Wiley, 2011
3. Ansel C. Ugural, Mechanical Design of Machine Components, SI Version CRC Press, 2018.
4. Wei Jiang, Analysis and Design of Machine Elements. Wiley, 2019

5. Vijay Kumar Jadon, Suresh Verma, Analysis and Design of Machine Elements, I.K. International Publishing House Pvt. Limited, 2010


Web Resources

1. <https://mech.iitm.ac.in/meiitm/course/design-of-machine-elements/>
2. <https://nptel.ac.in/courses/112/105/112105125/>
3. <http://www.nptelvideos.in/2012/12/design-of-machine-elements.html>

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3
2	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3
3	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3
4	3	2	3	3	-	-	-	-	-	-	-	2	2	2	3
5	3	2	2	3	-	-	-	-	-	-	-	2	2	2	3

Correlation Level: 1-Low, 2-Medium, 3- High


Dr. G. Balamuruga Mohan, M.Tech., Ph.D., I
 Professor & Head,
 Dept. of Mechatronics Engineering
 Sri Manakula Vinayagar Engineering College,
 Madagadipet, Puducherry-605 107.

U20MCP713 COMPUTER AIDED ENGINEERING LAB

L	T	P	C	Hrs
0	0	2	1	30

Course Objectives

- To draw the models in 3D using CAD packages
- To understand assembly process using CAD packages
- To analyze the models using analysis software.

Course Outcomes

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

CO1- Explore various CAD packages tools(K4)

CO2- Interpret drawings and develop machine components using standard CAD packages (K4)

CO3- Solve the structural, Modal and Thermal problems using analysis tools(K5)

List of Experiments

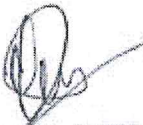
1. Part and Assembly drawing of Couplings using CAD packages.
2. Part and Assembly drawing of Bearings using CAD packages.
3. Part and Assembly drawing of Valves using CAD packages.
4. Modeling and Drafting of Machine Elements i.e. Screw Jack / Connecting Rod using CAD packages
5. Structural analysis of a given component using analysis software.
6. Shear Force and bending moment diagram using analysis software
7. Modal analysis of a given model using analysis software.
8. Thermal analysis of a given application using analysis software

Reference Books

1. David D. Bedworth, Mark R. Henderson, Philp M. Wolfe, "Computer Integrated Design and manufacturing", Mc Graw Hill International series, 1991
2. Ibrahim Zeid and R. Sivasubramanian, "CAD/CAM Theory and Practice", Revised First special Indian Edition, Tata Mc Graw Hill Publication, 2007
3. Ibrahim Zeid, "Mastering CAD/CAM", special Indian Edition, Tata Mc Graw Hill Publication, 2007

Web Resources

1. https://www.iitr.ac.in/departments/ME/pages/Computer_Aided_Engineering_Laboratory.html
2. <https://www.odu.edu/mae/instructional-laboratories/cae>
3. <https://research.fit.edu/computer-aided-engineering-lab/>


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Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
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