SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with 'A' grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119.

Department of Mechatronics Engineering

School of Mechanical Engineering

Minutes of Board of Studies Meeting held on 11-12-2021 (Saturday)

Meet Time: 9.45 a.m. to 11.30 noon

The meeting started with the welcome address delivered by Dr. S. Prakash, Professor and Dean (Session Chair). He introduced the new and revised courses offered to Mechatronics Engineering students to the BOS panel members. The following are the BOS members were present during the Mechatronics Engineering BOS meeting.

Sl. No.	Name	Designation	Institution	Role
1	Dr. S. Prakash	Professor and Dean	Sathyabama Institute of Science & Technology	Chair person
2	Dr.L.Vijayaraghavan	Professor	IIT Madras, Chennai	BoS Member (External)
3	Dr.N.GaneshKumar	Associate Professor	PSG Tech, Coimbatore	BoS Member (External)
4	Dr. B. Kanimozhi	Professor	Sathyabama Institute of Science & Technology	Member
5	Dr. S. Sivasaravanan	Associate Professor	Sathyabama Institute of Science & Technology	Member
6	Dr. M Sangeetha	Associate Professor	Sathyabama Institute of Science & Technology	Member
7	Dr. J. R. Deepak	Associate Professor	Sathyabama Institute of Science & Technology	Member
8	Dr. J. Lilly Mercy	Assistant Professor	Sathyabama Institute of Science & Technology	Member
9	Mr. V. Jayaprakash	Assistant Professor	Sathyabama Institute of Science & Technology	Member
10	Mr. J. Senthil Kumar	Assistant Professor	Sathyabama Institute of Science & Technology	Member
11	Mr. M Vigneshwar	Students	Sathyabama Institute of Science & Technology	Student Member
12	Mr Aman Dinodya	Students	Sathyabama Institute of Science & Technology	Student Member

- Mr. V. Jayaprakash proposed a new course entitled **SPR1403 Modern Manufacturing Processes** (Theory) based on the Industrials needs and futuristic requirements for the students in the field of manufacturing and Automation. Learning this course gives an insight of various non-conventional machining process. This allows the students to choose the appropriate machining process like ECM, EBM, LBM, PAM, USM etc. for different application. By learning this course, the student will also be able to develop a hybrid material removal process and develop new hybrid technologies which enables them to become an entrepreneur. Learning this course will also develop the skill set of the student and make them to be readily suitable for the manufacturing.

- As per the suggestions given by Dr. Sangeetha the theory course **SMR1301 - Micro Electro Mechanical Systems** (Regulation 2018) has been revised as **SMRA1602 - Micro Electro Mechanical Systems** (Regulation 2019) according to the current industrial needs which enables the student to learn basics of COMSOL software and to design micro devices, micro systems for various applications.

- Mr. J. Senthil Kumar revised the theory course **SMR1302 - Sensors and Instrumentation** (Regulation 2018) as SMRA1601Sensors and Instrumentation (Regulation 2019). Learning this course will help the student to design and calibrate the instruments for manufacturing industries. He also presented the revised practical course **SMRA2601 Sensors and Instrumentation Lab** (Regulation 2019) from **SMR4051 - Sensors and Instrumentation Laboratory** (Regulation 2018). This course enables the students to build his career in quality, automation and instrumentation engineering sectors.

- Dr. L. Vijayaraghavan, Professor from IIT Madras, Chennai welcomed the idea of introducing **SPR1403 Modern Manufacturing Processes** (Theory) courses saying that skill set of the students of Sathyabama Institute of science and technology will match the current needs of the industry in introducing **Robotics and Machine Vision System SMR1401** (Theory) and **Robotics Lab SMR4052** (Practical) in the curriculum

- Dr. L. Vijayaraghavan, Professor from IIT Madras, Chennai and Dr. N. Ganesh Kumar, Associate Professor from PSG Tech (External BOS members) reviewed all the courses. The Board members appreciated the inclusion of the new courses in 2019 Regulation.

- **NEWELY PROPOSED AND REVISED COURSES**

SPR1403	Modern Manufacturing Processes	2021	8	New
SMRA1601	Sensors and Instrumentation	2021	6	Revised
SMRA1602	Micro Electro Mechanical Systems	2021	6	Revised
SMRA2601	Sensors and Instrumentation Lab	2021	6	Revised

Red highlighted contents are

- **NEW COURSE**

SPR1403 MODERN MANUFACTURING PROCESSES
L T P Credits Total
Marks
3 0 0 3 100

COURSE OBJECTIVES
• To understand the basic concepts of different machining process.
• To understand the basic concepts of non-traditional machining
UNIT 1 MECHANICAL PROCESSES 9 Hrs.
Ultrasonic Machining- Elements of process, cutting tool system design, effect of parameters, economic considerations, applications, limitations of the process, advantages and disadvantages. Abrasive Jet Machining- Variables in AJM, metal removal rate in AJM. Water Jet Machining- Jet cutting equipments, process details, advantages and applications
UNIT 2 ELECTROCHEMICAL AND CHEMICAL METAL REMOVAL PROCESSES 9 Hrs.
Electrochemical Machining- Elements of ECM process, tool work gap, chemistry of the process, metal removal rate, accuracy, surface finish and other work material characteristics, economics, advantages, applications, limitations. Electrochemical Grinding – Material removal, surface finish, accuracy, advantages, applications.
UNIT 3 THERMAL METAL REMOVAL PROCESSES 9 Hrs.
Electric Discharge Machining (EDM) or spark erosion machining processes, mechanism of

metal removal, spark erosion generators, electrode feed control, dielectric fluids, flushing. Electrodes for spark erosion, selection of electrode material, tool electrode design, surface finish, machining
accuracy, machine tool selection and applications. Wire cut EDM. Laser beam machining (LBM) - Apparatus, material removal, cutting speed and accuracy of cut, metallurgical effects, advantages and limitations

UNIT 4 PLASMA ARC MACHINING (PAM) 9 Hrs.

Plasma, non-thermal generation of plasma, mechanism of metal removal, PAM parameters, equipment's for D.C. plasma torch unit, safety precautions, economics, other applications of plasma jets - Electron Beam Machining (EBM)– Generation and control of electron beam, theory of electron beam machining, process capabilities and limitations.

UNIT 5 ULTRASONIC MACHINING AND HYBRID PROCESSES 9 Hrs.

Ultrasonic machining system, mechanics of cutting, process parameters, analysis, capability, grain growing model, grain hammering model, limitations and applications Introduction, working principle, equipment, process parameters, process capabilities and applications of electro chemical grinding (ECG), electrical discharge grinding (EDG), electro chemical discharge grinding (ECDG).

Max.45 Hours

COURSE OUTCOMES:

On completion of the course, student will be able to

CO1: Analyse the fundamentals of the non-traditional machining processes.

CO2: Explain the working principle of chemical metal removal processes.

CO3: Choose a suitable nontraditional machining process for electrochemical metal removal processes.

CO4: Compare the construction and working of electrical metal removal processes.

CO5: Categorize the EBM, LBM, PAM and USM processes.

CO6: Apply a suitable nontraditional machining process for hybrid metal removal processes.

SATHYABAMA UNIVERSITY FACULTY OF MECHANICAL ENGINEERING

B.E. / B. TechREGULAR 95 REGULATIONS 2018

TEXT / REFERENCE BOOKS

1. Pandey P.C., Shan H.S., Modern Machining Processes – Tata McGraw Hill, 1980.
2. Ghosh and Malik, Machining Science Affiliated East-West Press, 2002.
3. Jain V.K., Unconventional Machining, 2004.
4. Benedict G.F. & Marcel Dekker Non Traditional Manufacturing Processes, 1995.
5. McGeongh Chapman J.A. and Hall - Advanced Methods of Machining, Kulwer Academic
Publishers Group, 1988
6. Gunsekaran A., Agile Manufacturing, Elsevier, 2001.
7. Hartely J.R., Cambridge M.A., Concurrent Engineering by Productivity by Press, 1992.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100 Exam Duration : 3 Hrs.

PART A : 2 Questions from each unit, each carrying 2 marks 20 Marks

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

- **REVISED COURSES**

SMRA1601 SENSORS AND INSTRUMENTATION
L T P Credits Total Marks
3 0 0 3 100
COURSE OBJECTIVES
ÿ To understand the characteristics of instruments and the sources and types of errors.
ÿ To be familiar with different types of sensors.
ÿ To know the techniques and methods for measurement of displacement, force, velocity.
ÿ To know the techniques and methods for measurement of Pressure, Temperature, Flow, Level.
UNIT 1 MEASUREMENTS 9 Hrs.
General Configuration and functional description of measuring instruments-Characteristics of instruments-Static characteristics -Dynamic characteristics - Types of errors -sources of errors- methods of elimination-Analysis of data - Limiting Errors-Relative limiting error-Combination of Quantities with limiting errors – Statistical treatment of data: Histogram, Mean, Measure of dispersion from the mean, Range, Deviation, Average deviation, Standard Deviation, variance.
UNIT 2 SENSORS 9 Hrs.
Sensors for Motion and Position Measurement, GPS, INS, Doppler, SONAR, Thermal Sensors – Gas Thermometric Sensors, Acoustic Temperature Sensor, Thermo-EMF Sensors, NQR Thermometry, Heat Flux Sensor, Chemical Sensor, Hall Effect Sensor, Tactile sensor, Ultrasonic sensor, High speed Image sensor.
UNIT 3 MEASUREMENT OF DISPLACEMENT, FORCE, VELOCITY 9 Hrs.
Transducers for displacement-potentiometer, LVDT, Capacitance types, Optical Encoder, Transducers for Strain-Strain gauge, gauge factor, temperature compensation, Wheatstone bridge, Force Measurement – Load cell, different types of load cells – elastic load cell-strain gauge load cell. Torque measurement-Using strain gauge and magneto elastic principle. Transducers for velocity– Revolution counter-capacitive tacho-drag up type tacho, D.C and A.C tacho generators – stroboscopic methods. Measurement of Acceleration - Elementary accelerometer, Seismic accelerometer, Practical accelerometers.
UNIT 4 MEASUREMENT OF TEMPERATURE AND PRESSURE 9 Hrs.
Measurement of Temperature- Thermometer, Thermocouple, Thermistor, Pyrometer. Measurement of Pressure: Manometers – different types of manometers, Elastic pressure transducers, Dead weight Tester, Electrical types, Vacuum gauges - McLeod gauge, Knudsen gauge, thermocouple gauge, ionization gauge, Differential pressure Transmitter - electrical & pneumatic types.
UNIT 5 MEASUREMENT OF FLOW, LEVEL 9 Hrs.
Orifice, Venturi, Pitot tube, flow nozzle rotameter, Dahl tube, Positive displacement meter, turbine flow meter, electromagnetic flow meter, ultrasonic flow meter, open channel flow measurement, solid flow measurement. Level: Sight glass, float gauge, displacer, torque tube, bubbler tube, diaphragm box, Differential Pressure methods, electrical methodsresistance type, capacitance type, ultrasonic level gauging.
Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understand the characteristics of instruments and determine the errors associated with it.
CO2 - List the various sensors and its applications.
CO3 - Understand the techniques of measurement of Displacement, Force, Velocity, Industrial parameters..
CO4 - Apply the knowledge of measurement in industries.
CO5 - Select a device for particular measurement.
CO6 - Develop an appropriate method for measurement.
TEXT / REFERENCE BOOKS
1. Sawhney A.K., “Electrical & Electronic Measurements and Instrumentation”, Dhanpat Rai Publications, 2001.
2. Patranabis.D, ‘Sensors and Transducers’, Prentice Hall of India, 1999.
3. Doeblin E.O. “Measurement System Applications and Design”, TMH, 5th Edition, 2004.
4. Rangan C.S. Mani V.S.V: and Sharma G.R., “Instrumentation Devices and Systems” Tata McGraw Hill.
5. Renganathan.S, “Transducer Engineering” -Allied Publishers Limited.
6. D.V.S Murthy –“Transducer and Instrumentation”, PHI, 1st Edition.
END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100 Exam Duration: 3 Hrs.
PART A: 10 Questions of 2 marks each - No choice 20 Marks
PART B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SMR1302 SENSORS AND INSTRUMENTATION

L T P Credits Total Marks

3 0 0 3 100

COURSE OBJECTIVES

- The principle and applications of various measurement systems.
- Learn about sensors and its uses.

UNIT 1 MEASUREMENT SYSTEMS 9 Hrs

Generalized Measurement System – Performance Characteristics: Static and Dynamic Characteristics – Errors in Measurements – Calibration and Standards – Generalized Performance of Zero Order, First Order and Second Order Systems – Classifications of Transducers - General working principles of Resistive, capacitive and inductive type transducers with governing equations.

UNIT 2 MEASUREMENT OF NON-ELECTRICAL PARAMETERS – 1 9 Hrs

Linear and angular displacement: Resistive, capacitive, inductive types and Optics (encoders), proximity sensors Velocity measurement: tachometers, tach generators and resolvers Temperature measurement: Contact type: Bimetallic, RTD, Thermocouple and Thermistor Non- Contact type: Radiation Pyrometer – Optical Pyrometer Humidity: Capacitive and resistive and hot and wet bulbs. Other sensors: Fire, smoke and metal detectors.

UNIT 3 MEASUREMENT OF NON-ELECTRICAL PARAMETERS -2 9 Hrs

Force measurement: Resistive type strain gauges: Bridge configurations, Temperature compensation, Load cells, Fiber optic strain gauge- Semiconductor strain gauges- Piezo electric transducers. Vacuum Measurement: McLeod Gauge, Thermal Conductivity Gauge – Ionization Gauge. Airflow: Anemometers Light: UV, IR, Light emitter and detector Introduction to Acoustics and acoustic sensors: Ultrasonic sensor- Types and working of Microphones and Hydrophones – Sound level meters- nuclear radiation sensors.

UNIT 4 MEASUREMENT OF ELECTRICAL PARAMETERS 9 Hrs

3 phase &1phase 1 watt meter and power factor - Resistive, capacitive and inductive measurements Instrument Transformers: CT and PT; their errors, Applications of CT and PT in the extension of instrument range.

UNIT 5 SIGNAL CONDITIONING AND DATA ACQUISITION 9 Hrs

Amplification, Filtering – Level conversion – Linearization - Buffering – Sample and Hold circuit – Quantization – Multiplexer / De multiplexer – Analog to Digital converter – Digital to Analog converter/P and P/I converter - Instrumentation Amplifier-V/F and F/V converter Data Acquisition -Data Logging – Data conversion – Introduction to Digital Transmission system.

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the characteristics of instruments and determine the errors associated with it.

CO2 - List the various sensors and its applications.

CO3 - Understand the techniques of measurement of Dispalcement, Force, Velocity, Industrial parameters..

CO4 - Apply the knowledge of measurement in industries

CO5 - Select a device for particular measurement

CO6 - Develop an appropriate method for measurement

SATHYABAMA UNIVERSITY FACULTY OF MECHANICAL ENGINEERING

B.E. / B. Tech REGULAR 79 REGULATIONS 2018

TEXT/ REFERENCE BOOKS:

1. Ernest O. Doebelin, “Measurement Systems – Applications and Design”, Tata McGrawHill, 2009.

2. D. Patranabis, “Sensors and Transducers”, PHI, New Delhi, 2nd Edition, 2010.

3. John Turner and Martyn Hill, “Instrumentation for Engineers and Scientists”, OxfordScience Publications, 1999

4. A.K. Sawney and Puneet Sawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th edition, Dhanpat Rai & Co, New Delhi, 2013.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100 Exam Duration: 3 Hrs.

PART A : 2 Questions from each unit, each carrying 2 marks 20 Marks

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SMRA1602 MICRO ELECTRO MECHANICAL SYSTEMS

L T P Credits Total Marks

3 0 0 3 100

COURSE OBJECTIVES

ÿ To have adequate knowledge in MEMS and Microsystems.

ÿ To understand the fabrication procedures and have knowledge on MEMS sensors and actuators and their applications.

ÿ To be made aware of the MEMS design procedures and RFMEMS.

ÿ To investigate various applications of MEMS.

UNIT 1 INTRODUCTION 9 Hrs.

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication – Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT 2 MICRO SENSORS AND ACTUATORS 9 Hrs.

Micro-sensing for MEMS: Piezo-resistive Pressure Sensor, Capacitive sensor, Piezoelectric sensing, Resonant sensing, Surface Acoustic Wave Sensors Vibratory gyroscope, Electromechanical transducers: Piezoelectric transducers, Electrostrictive transducers, Magnetostrictive transducers, Electrostatic actuators, Electromagnetic transducers, Electrodynamic transducers, Case Study-Piezo-resistive pressure sensor, Comb drive actuators.

UNIT 3 MICROMACHINING 9 Hrs.

Silicon Anisotropic Etching – Anisotrophic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies – Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods – LIGA Process – Assembly of 3D MEMS – Foundry process.

UNIT 4 POLYMER AND OPTICAL MEMS 9 Hrs.

Polymers in MEMS– Polimide – SU-8 – Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon – Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

UNIT 5 MEMS PACKAGING AND APPLICATIONS 9 Hrs.

MEMS packaging: Role of MEMS packaging, Types of MEMS packaging, selection of packaging materials, flip-chip and multichip Unit packaging, RF MEMS packaging issues. Micro-machined transmission line and components, micro-machined RF Filters, Micromachined Phase shifters, and Micro-machined antenna, Gyros and Bio-MEMS. Recent.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the basics of MEMS technology and microsystems.

CO2 - Acquire knowledge in the types and procedures involved in MEMS fabrication.

CO3 - Apply the acquired knowledge in understanding MEMS sensors and actuators.

CO4 - Analyse various MEMS design and familiarise with optical RF MEMS.

CO5 - Ability to understand the operation of micro devices, micro systems and their applications.

CO6 - Ability to design the micro devices, micro systems using the MEMS fabrication process.

TEXT / REFERENCE BOOKS

1. Vijay K. Varadan, K. J. Vinoy and K. A. Jose , “RF MEMS & Their Applications”, John Wiley & Sons, 2003.

2. Tai - Rai Hsu, “MEMS and Microsystems Design and Manufacturing”, Tata MC Graw Hill, New Delhi, Edition 2002.

3. Gabriel M Rebeiz, “RF MEMS - Theory Design and Technology”, John Wiley and Sons, 2003.

4. Nadim Maluf, “An introduction to Micro electro mechanical system design”, Artech House ,2000.

5. Chang Liu, ‘Foundations of MEMS’, Pearson Education Inc., 2012.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 Exam Duration: 3 Hrs.

PART A: 10 Questions of 2 marks each - No choice 20 Marks

PART B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SMR1301 MICRO ELECTRO MECHANICAL SYSTEMS

L T P Credits Total Marks

3 0 0 3 100

COURSE OBJECTIVES

On completion of this course the student will recognize

- Acquire knowledge about the Micromachining
- Acquire knowledge about MEMS Devices

UNIT 1 INTRODUCTION 9 Hrs.

Introduction to MEMS: Introduction to Microsystems and microelectronics - Market scenario for MEMS. Working principle: Trimmers scaling vector and scaling laws - scaling in geometry – scaling in rigid body dynamics- scaling in electrostatic forces - scaling in electricity - scaling in fluid mechanics - scaling in heat transfer. Materials for MEMS: Silicon as a MEMS material – Crystal structure of silicon - Miller indices - silicon compounds - SiO2, SiC, Si3N4 and polycrystalline silicon - silicon piezoresistors - Gallium arsenide - polymers for MEMS -quartz.

UNIT 2 FABRICATION OF MEMS 9 Hrs.

Clean room technology - Substrates and wafer - single crystal silicon wafer formation – ideal substrates - mechanical properties - Processes for bulk micro machining - Wet Vs dry etching - Chemical etching of Silicon - etchant systems and etching process - Reactive ion etching and DRIE - mask layout design. Processes for Surface micro machining - Deposition processes - ion implantation -Diffusion - oxidation - chemical vapor deposition -physical vapor deposition - deposition by epitaxy - photolithography and photoresists. Limitations of Bulk and surface micromachining - LIGA, SLIGA and other micro molding processes such as HeXIL

UNIT 3 DESIGN CONSIDERATIONS BASED ON MICROMECHANICS 9 Hrs.

Micromechanics considerations - static bending of thin plates - circular plates with edge fixed - rectangular plate with all edges fixed - square plate with all edges fixed - mechanical vibration - resonant vibration - micro accelerometers - design theory and damping coefficients – thermos mechanics - thermal stresses - fracture mechanics - stress intensity factors - fracture toughness – and interfacial fracture mechanics

UNIT 4 MEMS DEVICES 9 Hrs.

Micro actuation techniques - piezoelectric crystals - Shape memory alloys - bimetallic – conductive polymers. Micro motors - micro grippers - Microfluidic devices - Micro pumps - mechanical and nonmechanical micropumps - micro valves - valveless micropumps - Lab on Chip. Types of micro sensors – Micro accelerometer – Micro pressure sensors, MEMS switches/resonators, MEMS reliability.

UNIT 5 MICROSYSTEM PACKAGING AND DESIGN 9 Hrs.

Micro system packaging - materials die level device level - system level - packaging techniques – die preparation - surface bonding - wire bonding - sealing - Case studies. Design considerations – process design - mechanical design - applications of micro system in automotive - bio medical - aerospace – telecommunication industries

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the basics of MEMS technology and microsystems.

CO2 - Acquire knowledge in the types and procedures involved in MEMS fabrication.

CO3 - Apply the acquired knowledge in understanding MEMS sensors and actuators.

CO4 - Analyse various MEMS design and familiarise with optical RF MEMS.

CO5 - Ability to understand the operation of micro devices, micro systems and their applications.

CO6 - Ability to design the micro devices, micro systems using the MEMS fabrication process.

TEXT / REFERENCE BOOKS

1. William I. Fletcher, ‘An Engineering Approach to Digital Design’, PHI.
2. B. Holdsworth and R. C. Woods, ‘Digital Logic Design’, Newnes, 4th Edition
3. Morris Mano, Digital Design, Pearson Education, Asia 2002.
4. John F.Wakerley, Digital Design Principles And Practices,Third Edition Updated,Pearson Education,Singapore, 2002
5. Anil K. Maini, Digital Electronics, Principles, Devices and Applications, Wiley
6. Stephen Brown and Zvonko Vranesic, Fundamentals of digital logic design with VHDL, McGraw

Hill, 2nd Edition
END SEMESTER EXAM QUESTION PAPER PATTERN
Max. Marks : 100 Exam Duration : 3 Hrs.
PART A : 2 Questions from each unit, each carrying 2 marks 20 Marks
PART B : 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SMRA2601 SENSORS AND INSTRUMENTATION LAB

L T P Credits Total Marks
0 0 3 2 100

COURSE OBJECTIVES
1. To understand the working of sensors and transducers.
2. To understand the characteristics of sensors.
3. To calibrate voltmeter and ammeter.

SUGGESTED LIST OF EXPERIMENTS
1. Characteristics of Thermocouple.
2. Characteristics of Potentiometer.
3. Characteristics of Strain Gauge.
4. Characteristics of LVDT.
5. Calibration of Voltmeter using Potentiometer.
6. Calibration of Ammeter using Potentiometer.
7. Characteristics of Load Cell.
8. Characteristics of Resistance Thermometer.
9. Characteristics of Thermistor.
10. Characteristics of Synchros.
11. Characteristics of Piezoelectric Sensor.
12. Characteristics of Hall Effect Sensor.

COURSE OUTCOMES
On completion of the course, students are able to
CO1 - Understand the functioning of few sensors and transducers.
CO2 - Understand the characteristics of few sensors and transducers.
CO3 - Understand the process and need for calibration.
CO4 - Calibrate voltmeters and ammeters.
CO5 - Choose the sensor for measurement of few parameters.
CO6 - Use the appropriate sensor and calibrate.

SMR4051 SENSORS AND INSTRUMENTATION LAB

L T P Credits Total Marks
0 0 4 2 100
SUGGESTED LIST OF EXPERIMENTS
1. Study Of Sensors And Measuring Instruments
2. Measurement Of Strain Using Strain Gauge
3. Study Of Distance Measurement Using Ultrasonic Transducer
4. To Determine Output Characteristics Of LVDT And Measure Displacement Using LVDT
5. Flow Measurement and Level Detection.
6. Measurement of Inductance, Resistance and Capacitance.
7. Voltage and Current detection
8. Temperature Measurement using Thermocouple
9. Resistance Measurement using Potentiometer
10. SONAR
COURSE OUTCOMES
On completion of the course, students are able to
CO1 - Understand the functioning of few sensors and transducers
CO2 - Understand the characteristics of few sensors and transducers
CO3 - Understand the process and need for calibration.
CO4 - Calibrate voltmeters and ammeters.
CO5 - Choose the sensor for measurement of few parameters.
CO6 - Use the appropriate sensor and calibrate

Note:

- The Contents Highlighted in Green Colour are new inclusions
- The Contents Highlighted in Yellow Colour remains unchanged
- The Contents Highlighted in red colour are the portions being removed.

- Signature of BOS members

Sl. No.	Name	Signature
1	Dr. S. Prakash	
2	Dr.L.Vijayaraghavan	
3	Dr.N.Ganesh Kumar	Dr. Ganesh Kumar N
4	Dr. B. Kanimozhi	
5	Dr. S. Sivasaravanan	
6	Dr. M Sangeetha	
7	Dr. J. R. Deepak	
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