DESIGN AND FABRICATION OF IOT VALVE FOR PROCESSING PLANTS AND CROP FIELDS

AProjectReport

Submittedby

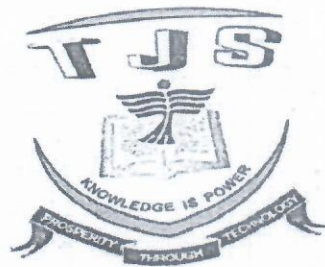|	
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In partial fulfillment for the award of the degree
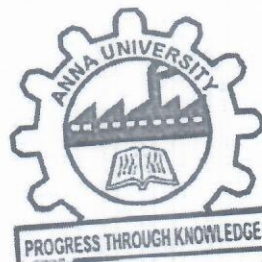of

BACHELOR OF ENGINEERING

IN
MECHANICALENGINEERING

T.J.SENGINEERINGCOLLEGE

PERUVOYAL(NEARKAVARAIPETTAI)

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ApprovedbyAICTEandAffiliatedtoAnnaUniversity,Chennai

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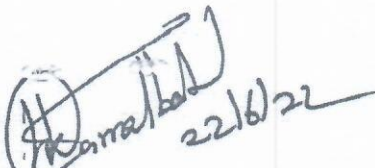Peruvo... ...ettai,
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ANNAUNIVERSITY:CHENNAI 600025
JUNE 2022

ANNA UNIVERSITY: CHENNAI 600025
BONAFIDE CERTIFICATE

Certified that the project report " DESIGN AND FABRICATION OF IOT VALVE FOR PROCESSING PLANTS AND CROP FIELDS " is the bonafide work of " P.DINESH (112818114010), K.HAYATH BASHA (112818114013), S. JANARTHAN (112818114014), G.KUMARA GURU (112818114023) " who Carried out the project work under my supervision.

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Submitted for project viva voice held on 22/6/22

INTERNAL EXAMINER

EXTERNAL EXAMINER

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ABSTRACT

Here we are introducing the IOT Valve. Biggest benefits of IOT will be improved operational efficiency of control valves. In a typical processing plant, media or fluids flow through processing equipment. Control valves perform the critical function of regulating process variables such as pressure, temperature, and flow rate.

Our project consists of Brass valve, ESP 32S, 4 channel Relay Module Lm2596 DC-DC Buck Converter, Power Supply, Customized Shaft, Limit Switches, Connecting Wires andWiper Motor. The model is fixed in the base frame. The Brass Valve is fixed with the Shaft. Wiper Motor is connected to the Shaft, Thus the motor and valve are connected.

When the power supply is given,theMotorstarts to rotate, theShaft connected to the motor rotatesandsimultaneously the Valve gets rotated by the main shaft. Thus the valve is operated.

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ME8791 **MECHATRONICS** 3 0 0 3

OBJECTIVE:
- To impart knowledge about the elements and techniques involved in Mechatronics systems which are very much essential to understand the emerging field of automation.

UNIT I   INTRODUCTION   9
Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors

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UNIT II   MICROPROCESSOR AND MICROCONTROLLER   9
Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontroller – Block diagram,.

UNIT III   PROGRAMMABLE PERIPHERAL INTERFACE   9
Introduction – Architecture of 8255, Keyboard interfacing, LED display –interfacing, ADC and DAC interface, Temperature Control – Stepper Motor Control – Traffic Control interface.

UNIT IV   PROGRAMMABLE LOGIC CONTROLLER   9
Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC.

UNIT V   ACTUATORS AND MECHATRONIC SYSTEM DESIGN   9
Types of Stepper and Servo motors – Construction – Working Principle – Advantages and Disadvantages. Design process-stages of design process – Traditional and Mechatronics design concepts – Case studies of Mechatronics systems – Pick and place Robot – Engine Management system – Automatic car park barrier.

                                                                          TOTAL : 45 PERIODS

OUTCOMES:
Upon the completion of this course the students will be able to
CO1 Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.
CO2 Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
CO3 Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing
CO4 Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
CO5 Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

TEXT BOOKS:
1. Bolton, "Mechatronics", Prentice Hall, 2008
2. Ramesh S Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Prentice Hall, 2008.

REFERENCES;
1. Bradley D.A, Dawson D, Buru N.C and Loader A.J, "Mechatronics", Chapman and Hall, 1993.
2. Clarence W, de Silva, "Mechatronics" CRC Press, First Indian Re-print, 2013
3. Devadas Shetty and Richard A. Kolk, "Mechatronics Systems Design", PWS publishing company, 2007.
4. Krishna Kant, "Microprocessors & Microcontrollers", Prentice Hall of India, 2007.
5. Michael B.Histand and Davis G.Alciatore, "Introduction to Mechatronics and Measurement systems", McGraw Hill International edition, 2007.

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DESIGN OF MACHINE ELEMENTS	3	0	0	3

ME8593

OBJECTIVES

- To familiarize the various steps involved in the Design Process
- To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
- To learn to use standard practices and standard data
- To learn to use catalogues and standard machine components
- (Use of P S G Design Data Book is permitted)

UNIT I   STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS   9

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – curved beams – crane hook and 'C' frame- Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

UNIT II   SHAFTS AND COUPLINGS   9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines - Rigid and flexible couplings.

UNIT III   TEMPORARY AND PERMANENT JOINTS   9

Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.

UNIT IV   ENERGY STORING ELEMENTS AND ENGINE COMPONENTS   9

Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V   BEARINGS   9

Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, – Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the influence of steady and variable stresses in machine component design.

CO2 Apply the concepts of design to shafts, keys and couplings.

CO3 Apply the concepts of design to temporary and permanent joints.

CO4 Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.

CO5 Apply the concepts of design to bearings.

TEXT BOOKS:

1. Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2016.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 9th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

1. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010
2. Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.
3. P.C. Gope, "Machine Design – Fundamental and Application", PHI learning private ltd, New Delhi, 2012.
4. R.B. Patel, "Design of Machine Elements", MacMillan Publishers India P Ltd., Tech-Max Educational resources, 2011.
5. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Edition, Wiley, 2005
6. Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2015.

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