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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)
Fifth Semester, B.E. - Mechanical Engineering
Semester End Examination; February / March - 2022
Mechatronics and Microprocessor

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Identify Mechatronics system, measurement systems, Open & Closed loop control systems and different types of sensors.

CO2: Understand Electrical systems, Mechanical switches, relays, solid state switches, diodes, thyristors and triacs, bipolar transistors, MOSFETS, solenoids and distinguish DC motors, permanent magnet DC motors with field coils, brushless permanent magnet DC motors, AC motors, stepper motors and their merits and demerits.

CO3: Analyse signal conditioning process, protection, filtering, Multiplexers, Data Acquisition system.

CO4: Evaluate Organization of Microprocessor, instructions, machine and mnemonics codes, machine and assembly language programming, High level language programming.

CO5: Generate Decimal number system, Hexadecimal number system, conversion from one number system to another, negative number representation.

<u>*Note:*</u> *I) PART - A is compulsory. **Two** marks for each question.*
*II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I: PART - A	**10**			
I a.	Define Transducer and Sensor.	2	L1	CO1	PO1
b.	Mention any four types of solid state switches.	2	L1	CO2	PO1
c.	Define operational amplifier. Give example.	2	L1	CO3	PO1
d.	Mention the three forms of busses in a microprocessor system.	2	L1	CO4	PO1
e.	Define OR gate and write the truth table for two inputs.	2	L1	CO1	PO1
	II: PART - B	**90**			
	UNIT - I	**18**			
1. a	With suitable diagram, explain the microprocessor based engine management system.	10	L3	CO1	PO3
b.	Describe various elements of closed loop control system with a suitable example.	10	L2	CO1	PO3
c.	Discuss the working principle of PVDF tactile sensor.	8	L2	CO1	PO3
	UNIT - II	**18**			
2 a.	With a sketch and driver circuit, explain how relays work?	10	L3	CO2	PO2
b.	Describe the principle of brushless DC permanent magnet motor.	10	L3	CO2	PO3
c.	Summarize the merits and demerits of stepper motor.	8	L2	CO2	PO3

UNIT - III			**18**		
3 a.	Explain the following:				
	i) Inverting amplifier		10	L2 CO3 PO2	
	ii) Non-inverting amplifier				
b.	Describe the following with neat sketches:				
	i) Weighted resistor DAC		10	L2 CO3 PO2	
	ii) Successive approximation ADC				
c.	Explain the principle of wheat stone bridge.		8	L2 CO3 PO2	
UNIT - IV			**18**		
4 a.	Describe assembly, machine and high level language programming.		9	L3 CO4 PO3	
b.	Write a note on register of microprocessors.		9	L2 CO4 PO2	
c.	Summarize the instruction set of 8085.		9	L2 CO4 PO3	
UNIT - V			**18**		
5 a.	Discuss NAND, NOR, XOR gates with their symbols and truth table for two inputs.		9	L2 CO5 PO1	
b.	Illustrate representation of floating point numbers.		9	L2 CO5 PO2	
c.	Write a note on addition and subtraction of binary integers.		9	L2 CO5 PO2	

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