RV Educational Institutions ®
RV College of Engineering ®

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

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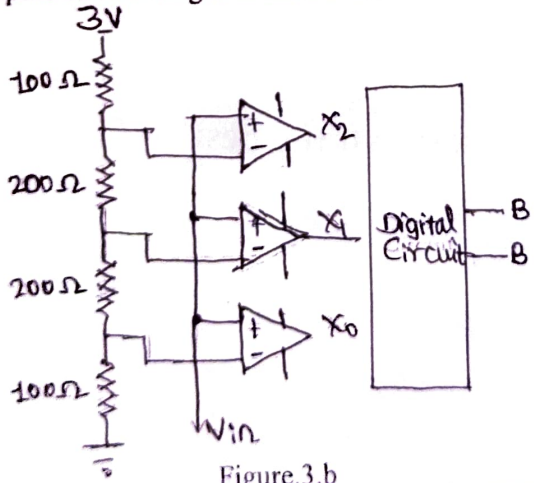
1RV22AI007

Academic year 2022-2023 (Even Semester)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Date	09-09 2023	Maximum Marks	50
Course Code	22EM211	Duration	90 Min
Semester	II Semester	Improvement Test	

Introduction to Embedded Systems

No	Questions	M	BT	CO
1	a. What are the three basic operations in analog-to-digital data conversion? Explain each operation briefly with the help of a diagram.	05	1	4
	b. What is the SPI communication protocol, and how is it used in embedded systems? What are the advantages and disadvantages of using SPI over other protocols?	05	1	4
2	a. How does the I2C communication protocol work in embedded systems, and what are its key features?	05	2	4
	b. With neat diagram, explain the working of 3-bit Flash ADC	05	2	3
3	a. With neat circuit diagram, explain the working of R2R ladder type DAC.	05	2	3
	b. A two-bit flash ADC is shown in figure.3.b. The input voltage varies from 0<Vin<5 Volts. Find the digital Output for a given input voltage Vin=3.5V. Mention the outputs of each stages in the circuit.	05	3	3
	 Figure.3.b			
4	a. How do you generate a PWM signal with a 75% duty cycle on pin number 3 using an Arduino board? Also, explain the principle of DC motor speed control using PWM technique.	05	2	3
	b. Why are motor drivers necessary for interfacing motors with an Arduino board, and how does an H-Bridge motor driver circuit work?	05	3	3
5	a. Explain the working principles of DC and stepper motors using a neat diagram?	05	3	4

	b. Write a program to rotate the DC motor in clock wise direction with 100rpm and anti-clockwise with 200rpm using Arduino and L298 H bridge IC. IN1 pin of the L298 IC is connected to pin 8 of the Arduino while IN2 is connected to pin 9. These two digital pins of Arduino control the direction of the motor. The EN A pin of L298 IC is connected to the PWM pin 2 of Arduino. This will control the speed of the motor. The table 10.b shows which direction the motor will turn based on the digital values of IN1 and IN2.	05	3	4

IN1	IN2	MOTOR
0	0	BRAKE
1	0	FORWARD
0	1	BACKWARD
1	1	BRAKE

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L
	Test	Max Marks	--	--	25	25	10	20	20	--	--	-