	RV College of Engineering® Department of Computer Science and Engineering Improvement Test and Quiz Paper		
Course & Code	IOT and Embedded Computing (CS344AI)		Semester: 4th Sem BE
Date : Aug 2024	Duration:120 minutes	Max.Marks:(10+50)=60 Marks	Staff : KB, SDV, MSS, MH
USN :	Name :		Section : A/B/C/D/CD/CY

NOTE: *Answer all the questions from Part-A (10 M) and Part-B (50 M)*

Sl.no	**PART - A**	**Marks**
1	Suggest any one application of Level 5 and Level 6 IOT deployment. Refer Reference book for many applications	2
2	Describe an Example of IoT service that uses publish-subscribe communication model. Name the popular application layer protocol for publish-subscribe model used in resource constraint IOT systems. **MQTT** IS USED EXTNESIVELY FOR UPLOADING SENSOR DATAS TO CLOUD. Weather Monitoring Systems, sensors publish, users/apps subscribe for the sensor data	2
3	Name the pins provided by RasberryPie to support I2C and SPI interfaces. **I2C: SDA,SCL,GND** **SPI: MOSI,MISO,SCK,SS**	2
4	Evaluate the following statements and indicate whether they are true/false. a) Von Neumann Architecture shares common memory for Data and Instructions TRUE: The von Neumann architecture uses a shared bus between program memory and data memory. This means that both program instructions and data are stored in the same memory and are accessed through the same bus. b) Harvard Architecture has separate physical memories for Data and Instructions TRUE: It uses two separate physical addresses for storing and accessing both instructions and data.	2
5	Consider a four-bit ALU which does four bits arithmetic. When the following four-bit numbers are added, what is the status of NZCV flags? 1101 + 1011 ANS: N=1, C=1, Z=0, V=0	ANS

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<tr><th>Sl.no</th><th>PART - B</th><th>Marks</th></tr>
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Draw the deployment design of the weather monitoring IOT system. Further, show the mapping of IOT Level to Functional Groups for the weather monitoring IoT system.

Refer the reference book

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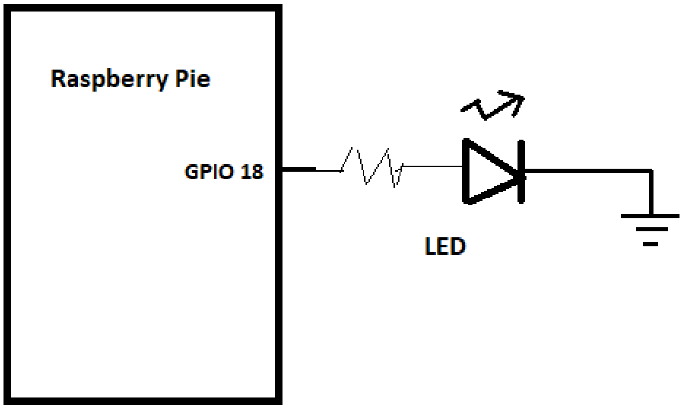
Write the programs to perform the following: (draw interface diagrams)

- Interface one LED to GPIO 18, and program for blinking the LED (use RasberryPie and phython)
- Interface one LDR to D36 and LED to D2, and make the LED on/off based on Light Intensity (use ESP32 and embedded C)



Python code:

```
Import sleep from time
Import RPi.GPIO as GPIO
GPIO.setmode(GPIO.BCM)

GPIO.setup(18,GPIO.out)

Def toggleLED(pin)
  State = not state
  GPIO.output(pin,state)

While true:
   Try:
        toggleLED(pin)
        sleep(.1)
        except KeyboardInterrupt:
             exit()
```

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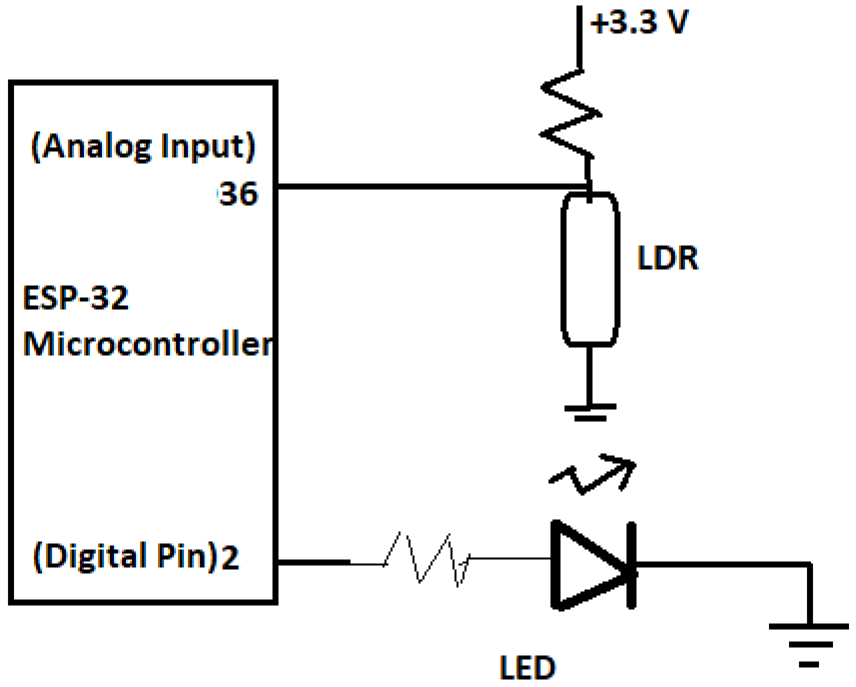


NOTE:

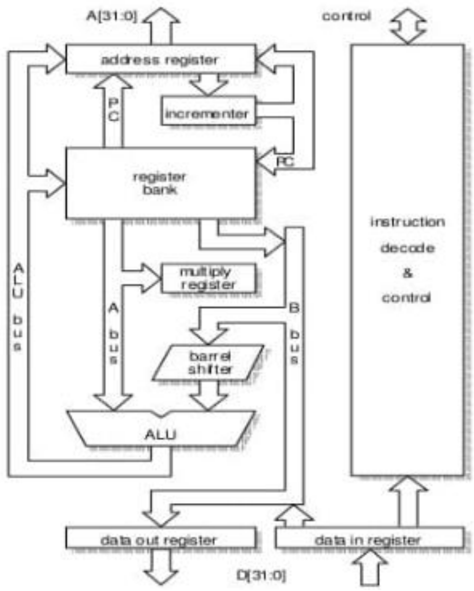
In the above diagram, when the light falls on the LDR, its resistance reduces, hence the voltage read at pin36 will be less (its digital value will be less). More the darkness, more digital value will be read, hece the LED is made ON.

Embedded C Code:

```
#include <esp32.h>
#define LEDPIN 2
#define LDRPIN 36
Int ldr_threshold = 800;
Void setup()
{
pinMode(LEDPIN, OUTPUT);
pinMode(LDRPIN, INPUT);


}
Void loop()
{
 Int ldr_value = analogRead(LDRPIN); // give digital value for analog input 0-1023
 If( ldr_value > ldr_threshold)
    digitalWrite(LEDPIN,HIGH);
 else
    digitalWrite(LEDPIN,LOW);

}
```

3	The purpose of the home intrusion detection system is to detect intrusion using sensors (PIR sensor and Door sensor). Design Home Intrusion Detection system using RPie/ESP32 with PIR motion sensor for motion detection and door sensor for detecting opening / closing of the door (for one room). Draw the following (no explanation required) - Process Specification - Domain model - Deployment design - Functional & Operational View specifications Refer reference book	
4	a) With a neat diagram explain the architecture of ARM Microcontroller. The ARM Architecture  A[31:0] control address register incrementer PC PC register bank instruction decode & control multiply register ALU bus A bus B bus barrel shifter ALU data out register data in register D[31:0] Diagram + Explanation: 3m + 2m b) With the neat diagram briefly describe operating modes and register organization of ARM ISA. Mention the use of following Registers: R13,R14,R15,CPSR and SPSR.	5 5

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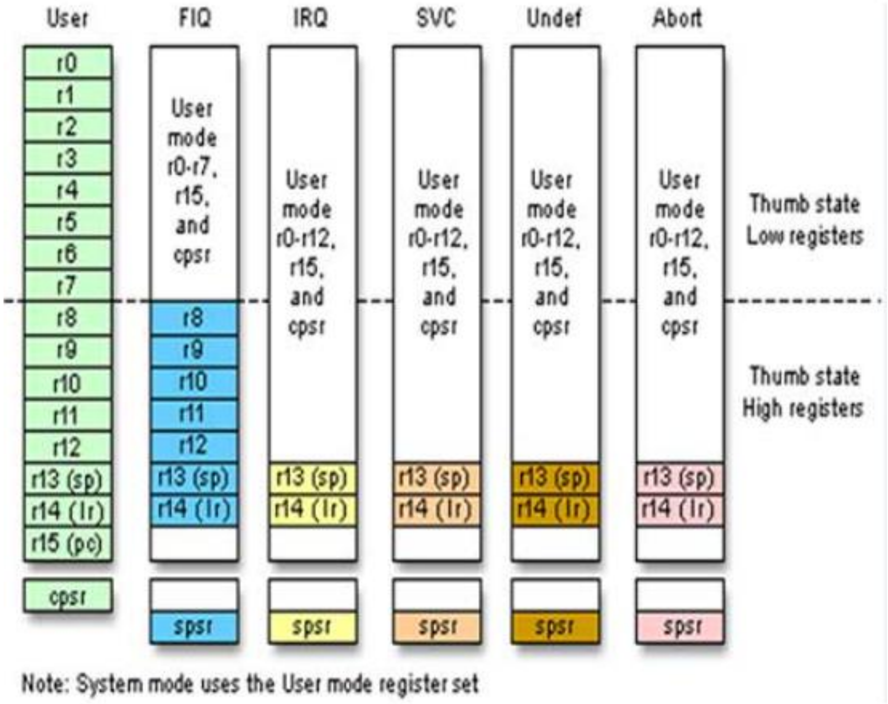
User
FIQ
IRQ
SVC
Undef
Abort
r0
r1
r2
r3
r4
r5
r6
r7
r8
r9
r10
r11
r12
r13 (sp)
r14 (lr)
r15 (pc)
cpsr
User mode r0-r7, r15, and cpsr
User mode r0-r12, r15, and cpsr
spsr
Thumb state Low registers
Thumb state High registers

Note: System mode uses the User mode register set

Diagram + Explanation: 3m + 2m
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a) Explain how embedded system are classified.

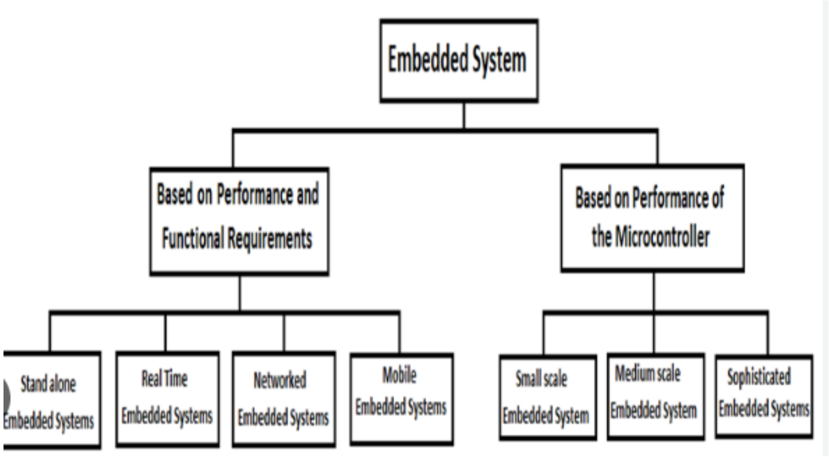
Embedded System
Based on Performance and Functional Requirements
Based on Performance of the Microcontroller
Stand alone Embedded Systems
Real Time Embedded Systems
Networked Embedded Systems
Mobile Embedded Systems
Small scale Embedded System
Medium scale Embedded System
Sophisticated Embedded Systems

Diagram + Explanation: 3m + 2m

b) Differentiate between RISC and CISC architecture.
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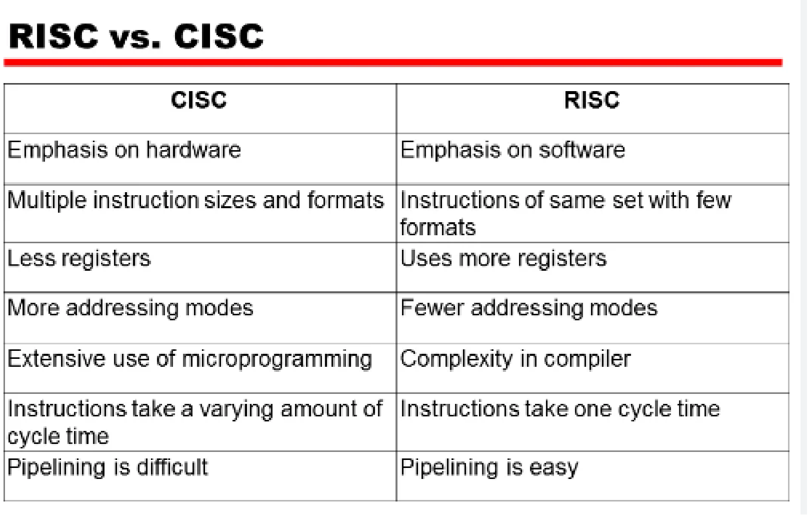

RISC vs. CISC

CISC	RISC
Emphasis on hardware	Emphasis on software
Multiple instruction sizes and formats	Instructions of same set with few formats
Less registers	Uses more registers
More addressing modes	Fewer addressing modes
Extensive use of microprogramming	Complexity in compiler
Instructions take a varying amount of cycle time	Instructions take one cycle time
Pipelining is difficult	Pipelining is easy