External Lab, ES and IoT question paper:

1. Write the following Assembly programs for 8051

   a) Create a square wave of 50% duty cycle on bit 0 of port 1

   b) Create a square wave of 66% duty cycle on bit 3 of port 1

   NOTE: use software delays

2. A switch is connected to pin p1.7. Write C and assembly language program (8051) to check the status of switch and perform the following:

   If switch status is 0, send 45H to P2 else 55H (use Keil simulator)

3. Write an assembly and C program (8051) for generating a square wave of 50% duty cycle on the P1.5 bit. Use timer0 in mode1 to generate the time delay. Show the calculations for the frequency of the square wave generated. (Assume clock frequency as 11.0592MHz)

4. Assuming that XTAL=11.0592MHz, write an assembly and C program (8051) to generate a square of 2KHz frequency on pin p1.5. Show relevant calculations.

5. Assuming that XTAL =11.0592MHz, write an assembly and C program (8051) for generating a square wave of smallest frequency with timer0 in mode1. Show relevant calculations

6. Assuming that XTAL =11.0592MHz, write an assembly and C program (8051) for generating a square wave of largest frequency with timer0 in mode1. Show relevant calculations

7. Assuming that XTAL=11.0592MHz, 8051 timer1 operated in mode2 and started with initial value of 5 H. write an assembly and C language program for generating a square on p2.0. Calculate the frequency of the square wave generated.

8. Write an assembly and C program for the 8051 to transfer letters “YES” only 5 times. Write and explain Special Function Registers used for framing the program.

9. Write an assembly and C program for the 8051 to transfer letters “RANI” continuously. Write and explain Special Function Registers used for framing the program.

10. Write an assembly and C program for the 8051 to transfer letters “IT DEPT” only one time. Write and explain Special Function Registers used for framing the program.

11. Write an assembly and C program for the 8051for generating square wave that has high portion 25 micro seconds and low portion 15 Micro seconds using Timer 0 with mode of operation of your choice and also show relevant calculations.

12. Write an assembly program for the 8051 for generating a square wave of 50Hz at pin p1.2 use timer 0 in mode2 for delays and simultaneously transfer data from p2 to p0.

    (HINT: operate timer in interrupt mode). Show relevant calculations for delay.

13. Write an assembly and C program for rotating stepper motor 270 degrees clock wise and 180 degrees anticlock wise. Show relevant calculations

14. Write an assembly and C program for rotating stepper motor 90 degrees clock wise and 360 degrees anticlock wise continuously. Show relevant calculations
15. Write an assembly and C program for generating a triangular wave using DAC on two ports.

16. Write an assembly and C program for generating square wave on one port and triangular wave on other port using DAC
17. Write a C program to display your name using seven segment display interfaces

18. Write a program to display "Your name and Roll no" on LCD display interface.

19. Write a program to interface ADC (analog to digital converter) with 8051 using proteous software.

20. Write a program to interface decimal keyboard with 8051 using proteous software.

21. Write a program to initiate multiple processes using **VxWorks** tasking routines.

22. Write a program to demonstrate the use of **VxWorks** semaphores

23. Write a program for creating a Queue and to transfer message from task2 to task1 in **VxWorks**

24. Write a program for creating a Queue and to transfer message from task1 to task2 in **VxWorks**

25.Write a python program for blinking of LEDs which are interfaced through MCP23017 and connected to Raspberry Pi.

- **RBG** LED Blinking
- **RRR** LED Blinking
- **BBB** LED Blinking
- **GGG** LED Blinking

26.Write a python program for controlling LEDs with switches, connected to Rasberrypi3

27 a). Write a python program for RELAY CONTROL connected to Raspberry Pi.

b). Write a python program for implement BUZZER control that is interfaced through MCP23017 and connected to Raspberry Pi.

28) Write a program to interface PIR sensor to Raspberry Pi.

29) Write a program to interface Ultrasonic sensor to Raspberry Pi. calculate the distance of the object.

30) Write a program to rotate the Servo Motor 0 degrees, 90 degrees ,180 degrees and 270 degrees continuously with Raspberry Pi

31) Write a python program for controlling LED's connected to Rasberrypi with mobile after establishing connection between Pi and mobile through Bluetooth

32. Write a python program for controlling servo motor connected to Rasberrypi with mobile after establishing connection between Pi and mobile through Bluetooth

33 Write a python program for controlling buzzer connected to Rasberrypi with mobile after establishing connection between Pi and mobile through Bluetooth

34. Write a python program to switch on the buzzer when temperature increases beyond certain threshold, use BME280 temperature sensor and Buzzer connected to Rasberrypi (On Board)

36. Write the following Assembly programs for 8051

a) Create a square wave of 50% duty cycle on bit 0 of port 1

b) Create a square wave of 66% duty cycle on bit 3 of port 1

NOTE: use hard ware delays

37. Write a python program to rotate the servo motor 180 degrees from 0 degrees when intruder detected through PIR sensor

38. Write a python program to rotate the servo motor 270 degrees from 0 degrees when intruder detected through ultrasonic sensor at certain distance

Theory questions:

1. Draw the block diagram of 8051 and explain
2. Draw port circuits of 8051 and explain
3. List out modes of operations of timers in 8051 and explain
4. Explain serial communication modes of 8051
5. Explain about interrupts in8051
6. Draw the formats of TCON,SCON,PCON and explain
7. Draw the formats of IP,IE ,TMOD and explain
8. Draw the block diagram of ARM7
9. Explain the modes of operation of ARM7
10. Explain Register organization on ARM7
11. Write the differences between ARM and Thumb instruction and also draw Thumb to Arm decompressor
12. Write a program to pick largest number from a series for ARM7
13. Explain about Characteristics of good RTOS
14. Explain how semaphores used in Shared data problems with a µc Os program example
15. Explain about rules to be followed in RTOS by interrupt procedures.
16. Describe the following and also pitfalls

a) mailboxes b) pipes c) message queues

17. Describe memory management in RTOS
18. Describe the I2C bus protocol
19. Explain CAN protocol and applications
20. Define IoT and explain characteristics of IoT
21. Define Sensor and explain operation thermocouple and ultrasonic sensor
22. Define Sensor and explain operation PIR and LDR
23. Define actuator and explain about Solinoid , Mechanical actuator
24. Define actuator and explain about Hydrolic , Mechanical actuator
25. Define actuator and explain about temperature and magnetic actuator
26. Describe different communication models used in IoT
27. Explain any 4 application layer protocols of IoT
28. Describe the physical design of IoT
29. Explain Logic design of IoT\
30. Describe IoT design methodology for controlling the light in the room using webapplicaion
31. Describe different design templates used in IoT
32. Write the differences between SPI, I2C bus protocols
33. Write the differences between Rasberrypi and aurdino Uno
34. Write the differences between M2M and IoT
35. Discuss different API used in IoT.
36. Discuss any one case study on IoT.
37. Explain about device in IoT with neat diagram
38. Explain about RasberryPi features with neat diagram