# Velammal Institute of Technology

## Department of Electrical and Electronics Engineering
## Exhaustive question bank

**Sub Code/Title: EE8018 –Microcontroller based system design**
**Year/Sem/Dept: IV / VIII /EEE**

### UNIT I INTRODUCTION TO PIC MICROCONTROLLER
### PART-A

1. What is PIC?

2. Difference between microcontroller and PIC microcontroller. [Nov'17]

3. Give the various comparison of PIC families.

4. Give the architecture of PIC 16C6X series. (Jan'12)

5. Give the Core Features of PICI6CXX Microcontroller.

6. Give the Peripheral Core Features of PIC16CXX Microcontroller.

7. Illustrate the CPU —Harvard architecture of P/C microcontroller. [OR] Draw the program memory organization of PIC16C6x microcontroller. [Apr'18]

8. What are the features of Harvard architecture?

9. Define instruction pipelining.

10. Differentiate between Harvard architecture and von Neumann architecture.

11. How P1C16CXX is accessed for data memory or register files?

12. Why PICI6CXX is said to be an orthogonal?

13. What is the difference between the presence or absence of A in the microcontroller?

14. What is the usage of working register?

15. Define the register file structure in Microcontroller. Classify it?

16. What is general purpose register file?

17. What is special purpose register file?

18. Write the significant of brown out reset [BOR] mode? [Apr'17]

19. Explain about watchdog timer? (Jan'11)

20. What is meant by PCLATH? Give its use.

21. Give the importance of MCLR?

22. What are register present in the CPU register in the microcontroller

23. Write about the Status Register of PIC Microcontroller. [Nov'16]

24. What is the role of status register?

25. What is the use of RP0 and RP1 in Register file?

26. What are the components of Program memory Organization 16CXX?

27. What is the need of FSR?

28. What is RISC? (Jun'14, Jul'13)

29.  What are the benefits of having RISC architecture? [Apr'17]

30. List out all the addressing Modes in PIC Microcontroller. (Jan '12, Nov'16, Nov'17)

31. What do you mean by direct addressing mode?

32. What is instruction pipelining? (Jan '11)

33. What is indirect addressing mode?

34. What is Access bank in PIC18?

35.  What is I/O port of PIC? (Jan'14)

36.  Mention the guidelines suggest by Microchip Technology will be used for writing assembly language code.

37.  What are the groups of instruction set in PIC micro controller? (Jan'13)

38.  Write any four instructions of PIC microcontroller and state in a line the operation

39. Using the instruction of PIC microcontroller, convert BCD to Hex. (Jan'13)

40.  How is the internal RAM in PIC microcontroller accessed by indirect addressing?

41.  Write the operation carried out when these instructions executed by PIC.

## PART-B

1. .  Explain clearly about the architecture of PIC Microcontroller?  [Nov'16, Apr'17]

2.  Draw and explain about the architecture of PIC microcontroller. [Nov'17]

3.  Explain the architecture of PIC16C6x microcontroller with neat block diagram. [Apr'18]

4.  Explain various Memory Organisation of PIC microcontroller. [Nov'16, Apr'17]

5.  Explain the different PIC addressing modes? [Apr'17, Nov'17]

6.  With examples, explain the addressing modes of PIC16C6x microcontroller. [Apr'18]

7.  Mention the guidelines and instruction sets used in PIC controller? [Nov'16]

8.  Explain about the instruction set of PIC microcontroller. [Nov'17]

9.  Write PIC microcontroller assembly language program to arrange the given array having byte type data in ascending order. [Apr'18]

## UNIT II - INTERRUPTS AND TIMER
### PART-A

1.  What is interrupt service routine (ISR)?

2.  Mention the interrupts available in PIC microcontroller?[Apr'17]

3.  Define subroutine. [Nov'17]

4.  Write the loop time subroutine program for interrupt.

5. What is the role of timer module in PIC16CXX?

6.  What is the minimum and maximum clock frequency of PIC 16cxx? [Nov'16]

7.  What is the role of TRISx register in I/O port management?  [Nov'16]

8.  Write an ALP to initialize the PORTA using PIC microcontroller. [Apr'17]

9.  Mention the working of Timer 0.

10. What is the necessity of prescaler in the timer operation? [Apr'18]

11. Mention the usage of prescaler of Timer 0.

12. What is the feature of Timer 0?

13. Explain the functions of Timer 1.

14. How timer 1 performs in timer mode?

15. How timer 1 performs in counter mode?

16. What are the features of timer 2?

17. Write usage of Timer 2.

18. Elaborate the CCP module of PIC. (Jun'12)

19. Draw the INTCON register of configuration of PIC.

20. List out the code templates in PIC.

21. Draw the optional register configuration of PIC.

22. What do you mean by state machine? [Nov'17]

23. What is softkeys?

24. What are applications of front panel softkeys?

25. How to display constant strings? [Apr'18]

## PART-B

1. Explain in detail about the PIC Microcontroller Interrupts? [Nov'16, Apr'17, Apr'18]

2. Explain the interrupt structure of PIC microcontroller with neat diagram. [Nov'17]

3. Explain how Intservice Interrupt Service Routine is achieved in PIC. [Nov'16, Apr'17, Apr'18]

4. What is meant by External Interrupts and explain how RB0/ INT External Interrupt Input is connected with PIC. [Apr'18]

5. How many timers are present in PIC16F8XX timer modules? Explain them? [Nov'16]

6.  In detail give an account on Timer programming. RAM/ROM allocation in PC. [Nov'17]

7.  Explain the modes of Timer 1 of PIC16C6x microcontroller with block diagram. Also explain the function of associated registers. [Apr'18]

8. Briefly explain the Display of Variable Strings in PIC controller? [Apr'17]

# UNIT III
# PERIPHERALS AND INTERFACING
## PART-A

1.   What are the two modes of operations of SSP?

2.  What is the use of I2C bus?

3. What is the role of master and slave operation performed by the I2C?

4. What is the function performed by the I2C?

5.  Illustrate I2C seven bit address format.

6. Difference between bus operation and subroutine operation. [Nov'17]

7. Define START and STOP signals of I2C?

8. Draw the start and stop conditions of I2C. [Apr'18]

9. Illustrate I2C 10 bit address format.

10. Mention the two conditions for utilization of FSR?

11. What is EEPROM?

12. Mention the PIC microcontroller RAM and EEPROM size.

13. What is ADC?

14. Using PIC micro controller how is analog signal converted into digital. (Jan'13)

15. List the various registers used in A/D conversion.

16. What is the function of TRISA pin?

17. Write a program to initialize portA.

18. Explain about UART?

19. List the register associated with UART? (Nov'16, Nov'17)

20. What is synchronous and asynchronous transmission?

21. Define baud rate. [Nov'17, Apr'18]

22. What is baud rate in asynchronous mode?

23. What is interfacing? (Jan'14)

24. While programming for LCD display, what initialization has to be done? (Jan'13)

25. What is the need for D/A converter? (Apr'11)

26. Microcontroller based control is advantageous than conventional control-Justify. (Apr'17)

27. How is temperature sensor interfaced with PIC microcontroller? (Apr'17)


**PART-B**

1. What is meant by I2C module? Explain how I2C is interfaced with PIC microcontroller. [Nov'16]

2. Exhibit the operation of I2C bus and develop embedded C program to transmit data using I2C bus. [Nov'17]

3. Explain briefly the concept of I2C subroutines. Illustrate with suitable example how I2 communication is carried out in PIC microcontroller. (Apr'17)

4. Explain the operation of ADC interfacing with PIC microcontroller. (Nov'16, Apr'17, Nov'17)

5. Draw and explain the architecture of on chip ADC of PIC microcontroller and write a suitable assembly language program for configuring the ADC. [Apr'18]

6. Write PIC microcontroller assembly language program to display the characters '2018' in the first row of 2 lines x 20 characters LCD. [Apr'18]


## UNIT IV INTRODUCTION TO ARM PROCESSOR
### PART A

1. What is ARM?

2. What are the features of the ARM architecture?

3. Why the ARM delayed branches were not used?

4. Why the simplicity of the ARM may be more apparent?

5. Define processor's instruction set

6. What is CPSR?

7. Write the CPSR format of ARM Processor. [Apr'18]

8. What are the three types of ARM instructions?

9. Explain most notable features of the ARM instruction set.

10. What is the structure of the ARM cross-development toolkit?

11. Write various levels of accuracy the ARMulator can be operated.

12. What are the On-chip RAM benefits?

13. What are the function of MMU?

14. What is the reason for including SWAP in the ARM instruction set?

15. Differentiate between RISC and CSIC.

16. List the features of RISC architecture.

17. What is Load-store architecture?

18. Give the features of ARM processor.

19. What the components are of ARM 7 functional architecture?

20. What are the ARM programmer's models?

21. What are the different classes of ARM exception?

22. What are the different classes of ARM instruction set?

23. What are the various ARM development tools? [OR] List out some of ARM
development tools. [Nov'16, Nov'17]

24. List the various Memory hierarchy.

25. What are the classifications of memory behaviour?

26. What is memory hierarchy?

27. What is L1 cache?

28. What is L2 cache?

29. What is the use of write buffers?

30. What is Tightly Coupled Memory (TCM)?

31. Define addressing modes of ARM processor.

32. List the different addressing modes used in the ARM processor.

33. List the various conditional flags used in ARM.

34. What is the purpose of program counter? (Nov'16)

35. Define Context Switching? (Apr'17)

36. State the function of ARMulator and define its operations at various levels of accuracy? (Apr'17)

37. Differentiate little – endian and big – endian memory organizations. [Apr'18]

**PART B**

1. With neat sketch explain the functional block diagram ARM architecture. (Nov'16, Nov'17)

2. Write short notes on ARM MMU architecture. (Apr'17)

3. Explain the various operating modes programmers model in ARM processor. [Nov'16] MEC

4. Explain the ARM programmer's model in detail, with supporting diagram. [Apr'17]

5. Draw and explain the visible registers in an ARM processor. [Apr'18]

6. Explain the structure of the ARM cross – development tool kit. [Apr'18]

7. Explain the various data operations involved in ARM. Illustrate the concept of data operations in ARM processor. [Nov'17]

7. Write a subroutine to output a text string immediately following the call instruction using ARM processor? (Apr'17)

8. Write ARM assembly language program to multiply two 32 – bit binary numbers. [Apr'18]

9. Write a subprogram which copies a string of bytes from one memory location to another.
The start of the source string will be passed in r1, the length (in bytes) in r2 and the start of the destination string in r3. [Apr'18]

# UNIT V
# ARM ORGANIZATION
## PART A

1. What is instruction pipeline?

2. What is the need of pipeline in ARM?

3. What are the principal components of 3 stage pipeline? [OR]

What is the three stage pipelining in ARM processor? [Nov'17]

4. What is ARM datapath timing? [Apr'18].

5. What are the ARM 3 stage pipelines?

6. Define data processing Instructions executions.

7. Define data transfer Instructions executions.

8. What are the 5 stages of pipeline? [OR] What is five stage pipeline in ARM Processor? (Nov'16)

9. Define branch instructions executions

10. What is class of ARM implementation?

11. List the various ARM implementations.

12. List at least 4 instruction set used in ARM processor.

13. Write the operation carried out when CLZ instruction executed. [Apr'18]

14. What is load-Store Instructions?

15. What is Stack Operations?

16. What is the use of software Interrupt Instruction?

17. What is conditional Execution?

18. What are the most important features of coprocessor architecture?

19. What are the two implications of ARM9 core?

20. List the coprocessor Instructions.

21. List the different way of handling coprocessor handshake signals:

22.  What is the need of architectural support for high-level language?

23. Differentiate between ARM assembly-level languages and High-level languages.

24.  What are the characteristics of data types?

25. What are the simplest way to view breaks in the ARM pipeline

26. What is the role of a Coprocessor?  (Apr'17)[OR]

What are  the important features of Coprocessor architecture?

27. What are three signals of coprocessor interface?

28. How the datatypes of ARM characterized?

29. What are the different Data types in ARM?

30. What are the ANSI C basic data types?

31.  Explain ANSI C derived data types

32. Write FPA10 pipeline stages?

33. What are the Conditional statements used in ARM programs.

34. Different types of loop structure used in program.

35. List few Embedded ARM Applications  for ARM Processor.  (Nov'16)  [OR] Give the details about the real time embedded ARM applications. [Nov'17]

36.  Draw the structure of multicycle instructions of three stage pipeline operation? (Apr'17)

## PART B

1.  Explain the 5 – stage pipeline ARM cross – development tool kit. [Apr'18]

2.  Explain the instruction set of ARM Processor. (Nov'16)

3.  Discuss on coprocessor data transfer instruction of ARM processor. [Apr'18]

4.  Explain the ARM coprocessor interface or Explain how does the coprocessor interface  of the ARM work. (Nov'16)

5.  Write short on coprocessor data and register transfer. (Apr' 17)

6.  Explain the ARM floating point architecture. [Apr'18]

7.  Elaborate the working principle of the VLSI ISDN Subscriber Processor in detail. (Apr'17)

8.  Write a embedded C program to control the speed of the stepper motor and interface stepper motor with 8051. [Nov'17]

9.  Develop embedded C program to identify the key pressed and to display the pressed key in LCD display. [Nov'17]