**B.N.M. Institute of Technology**

**An Autonomous Institution under VTU**

**Department of Information Science and Engineering**

**Microcontroller and Embedded System (22ISE142)**

**Question Bank for Module 1**

1. Compare and Contrast microprocessor and microcontroller.
2. Explain ARM core data flow model with a neat diagram.
3. Along with neat diagram of an ARM based embedded system (Microcontroller), explain the hardware components.
4. Explain the different processor modes provided by ARM7.
5. Give the schematic of a Current Program Status Register of ARM7 processor briefing the individual bits.
6. What s Pipelining. Explain in detail schematically.
7. Discuss the ARM design philosophy.
8. Describe conditional execution. Write the different code suffix.
9. Differentiate between RISC and CISC processors.
10. Explain the major design rules to implement the RISC philosophy.
11. Briefly describe the concept of exceptions, interrupts and the vector table.
12. Explain the programmer’s model of ARM processors with complete register sets available.
13. What is pipeline in ARM? Illustrate with an example. Show the pipeline stages of ARM7, ARM9 and ARM10.

**Question Bank for Module 2**

1. Explain the MOV instruction set provided by ARM7 with the example for each.
2. Write a program for forward and backward branch by considering an example.
3. Write and explain arithmetic instructions with respect to the ARM processor.
4. Design ARM assembly language program to perform the addition and multiplication of two 32 bit numbers.
5. Explain the different branch instructions of ARM processor
6. Explain the different barrel shifter operations with suitable examples.

**Question Bank for Module 2**

1. Explain the working of ARM processor with co-processor instructions along with syntax.
2. Explain the working of Profiling and Cycle counting.
3. Explain the scheduling of following instructions with respect to the ARM9 TDMI pipeline implementation,

i)STR ii) LDRH iii) B Label

1. Explain the ARM swap instruction with an example code.

**Question Bank for Module 3**

1. What are the different types of memories used in Embedded System design? Explain the role of each.
2. List different purposes of embedded system with examples.
3. Briefly describe the classification of embedded systems.
4. What is an embedded system? Differentiate between general purpose computing system and embedded system.
5. Write a short note on : i) Real Time Clock ii) Watchdog Time v) Reset Circuit
6. Explain brown out protection.
7. List four onboard communication interfaces. Explain any one in detail.
8. Explain matrix keyboard interfacing.
9. What is an embedded system? Differentiate between general purpose computing system and embedded system.
10. Explain the working of the Stepper Motor.

**Question Bank for Module 4**

1. What are the operational and non-operational qualities attributes of an embedded systems.
2. Explain the fundamental issues in hardware software co-design.
3. With the functional block diagram, explain the operation of Washing Machine as Application-Specific Embedded system.
4. Explain unique characteristics of embedded systems.
5. What is sequential processing model? Draw a sequential processing model for car seat belt warning system using flow chart.
6. Explain Data flow graph and control data flow graph computational model with neat diagram.
7. Design an FSM model for Tea/Coffee vending machine.

**Question Bank for Module 5**

1. Explain the process of choosing an RTOS
2. Explain the working of target hardware debugging
3. Show the working of Emulators, Simulator and Debugging
4. With the help of neat diagram demonstrate the working of embedded system development environment.
5. Explain the concept of Binary Semaphore.
6. Explain the role of Integrated Development Environment (IDE) for Embedded Software development.

**The RISC design Philosophy, The CISC design Philosophy, Embedded System Hardware, Embedded System Software, Pipeline, Programme Instructions, Program Status Register Instructions, Loading Constants ARM programming using Assembly language: Writing Assembly code, Register Allocation, Looping Constructs, Embedded Vs General computing system, Major application areas of embedded systems, Core of an Embedded System, LED, 7 segment LED display, stepper motor, Push button switch, Embedded firmware, Display “hello world” message using internal UART, Quality Attributes of Embedded Systems, Operational quality attributes, non-operational quality attribute, Hardware Software Co-Design and Program Modelling, embedded firmware design and development, washing machine working, Embedded hardware and firmware, simulator, emulator**