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B.N.M. Institute of Technology

An Autonomous Institution under VTU

Semester End Assessment, September 2023

Fourth Semester BE, 2021-22 Scheme

Microcontroller and Embedded System-21CSE142

Duration: 3 Hours

Max. Marks: 100

Note: 1. Answer one full question from each Module (5Q x 20M=100 Marks)

Module 1					
Q. No	Questions	Marks	CO	PO	Cognitive Level
1 (a)	Identify and explain four major rules of RISC design Philosophy.	6	1	5,9,12/ 1	Apply
1 (b)	Make use of a neat diagram to explain the ARM core dataflow model.	7	1	5,9,12/ 1	Apply
1 (c)	Show how typical embedded devices can be designed based on ARM core, with a neat diagram.	7	1	5,9,12/ 1	Apply
OR					
2 (a)	Make use of a neat diagram to explain the software abstraction layers executing on hardware of an embedded system.	6	1	5,9,12/ 1	Apply
2 (b)	Build the Complete ARM register set with a neat diagram and explain showing banked operation for any one mode.	7	1	5,9,12/ 1	Apply
2 (c)	What is a pipeline? Compare ARM7 three-stage pipeline, ARM9 five-stage pipeline, and ARM10 six-stage pipeline.	7	1	5,9,12/ 1	Apply
Module 2					
3 (a)	Apply the concept of Barrel shifter for data processing instructions, with an example.	10	2	2,5,9,12/ 1	Apply
3 (b)	Build a program to find the factorial of a number and store the result in the register.	10	2	2,5,9,12/ 1	Apply
OR					
4 (a)	Make use of Load-store instructions to explain Single-Register Transfer and Swap Instruction with examples.	10	2	2,5,9,12/ 1	Apply
4 (b)	Build a program to add an array of 16-bit numbers and store the 32-bit result in internal RAM.	10	2	2,5,9,12/ 1	Apply
Module 3					
5 (a)	Compare unsigned division by a constant and signed division by a constant in designing hardware of division instruction.	10	3	2,5,9,12/ 1	Evaluate

5 (b)	Interpret the issues that may encounter when porting C code to the ARM.	10	3	2,5,9,12/ 1	Evaluate
OR					
6 (a)	Interpret a simplified functional view of the five-stage ARM9TDMI pipeline, with example shows how a one-cycle interlock caused by load use and delayed load use.	10	4	2,5,9,12/ 1	Evaluate
6 (b)	Write an Assembly language Program to arrange a series of 32-bit numbers in ascending/ descending order with comments, memory representation, and sample output.	10	4	2,5,9,12/ 1	Evaluate
Module 4					
7 (a)	Compare embedded system versus general computing systems.	5	4	2,5,9,12/ 1	Analyze
7 (b)	Identify and explain sensors and actuators of embedded system differentiate between them.	8	4	2,5,9,12/ 1	Analyze
7 (c)	Identify and explain the classification of embedded systems based on generation and based on complexity and performance requirement.	7	4	2,5,9,12/ 1	Analyze
OR					
8 (a)	Compare and contrast microprocessor and Microcontroller of embedded system.	5	4	2,5,9,12/ 1	Analyze
8 (b)	Make use of Random Access Memory (RAM) to explain SRAM, DRAM and NVRAM.	8	4	2,5,9,12/ 1	Analyze
8 (c)	Write a program using embedded C to display "Hello World" message using Internal UART.	7	4	2,5,9,12/ 1	Analyze
Module 5					
9 (a)	Make use of diagram and explain the interfacing of stepper motor through the driver circuit to microcontroller.	6	5	2,5,9,12/ 1	Apply
9 (b)	Illustrate the connection of master and slave devices on the I2C bus.	6	5	2,5,9,12/ 1	Apply
9 (c)	Write a program to interface DAC to generate Triangular and Rectangular wave form.	8	5	2,5,9,12/ 1	Apply
OR					
10(a)	Construct the connection of keys in a Matrix Keyboard interfacing, with a neat diagram.	6	5	2,5,9,12/ 1	Apply
10(b)	Build Star Topology for USB Device Connection, with a neat diagram.	6	5	2,5,9,12/ 1	Apply
10(c)	What is the difference between assembler and disassembler? State their use in Embedded Application development.	8	5	2,5,9,12/ 1	Apply