

**Visvesvaraya Technological University, Belagavi**  
**MODEL QUESTION PAPER – Set I**  
**VI Semester, B.E (CBCS) EC/TC**

**Course: 15EC62 - ARM Microcontroller and Embedded Systems**

**Note: (i) Answer Five full questions selecting any one full question from each Module.**

**(ii) Question on a topic of a Module may appear in either its 1<sup>st</sup> or/and 2<sup>nd</sup> question.**

**Time: 3 hrs**

**Max. Marks: 80**

MODULE – I			
1	a	Briefly describe the functions of the various units with the architectural block diagram of ARM Cortex M3.	6
	b	Explain the applications of Cortex M3.	3
	c	Discuss the functions of R0 to R15 and other special registers in Cortex M3.	7
OR			
2	a	Describe the functions of exceptions with a vector table and priorities.	6
	b	Explain the operation modes of Cortex M3 with diagrams.	3
	c	Explain two stack model and reset sequence in ARM cortex M3.	7
MODULE -2			
3	a	Explain the following 16 bit instructions in Cortex M3: ADC, RSB, TST, BL, LDR, MOV, SVC, PUSH	7
	b	Write an ALP to find the sum of first 10 integer numbers.	4
	c	Write the memory map of Cortex M3 and explain briefly bit-band operations.	5
OR			
4	a	Explain the following 32 bit instructions in Cortex M3: AND, CMN, MLA, SDIV, STR, MRS, MRS, POP	8
	b	Write a C language program to toggle an LED with a small delay in Cortex M3.	4
	c	With a diagram, explain the organization of CMSIS.	4
MODULE - 3			
5	a	Explain the 6 purposes of Embedded systems with an example for each.	6
	b	Differentiate between (i) General Computing Systems and Embedded Systems and (ii) RISC and CISC architectures	4
	c	Explain the 3 classifications of Embedded systems based on complexity and performance.	3
	d	Mention the applications of Embedded systems with an example for each.	3
OR			
6	a	Explain the functions of Optocoupler and SPI bus with diagrams.	6
	b	Write a note on Embedded firmware.	4
	c	Explain SRAM design and features with a diagram.	3

	d	Write the architectural block diagram of embedded system and mention the components used.	3
MODULE – 4			
7	a	Explain the 6 operational quality attributes of an embedded systems.	5
	b	Define the 6 characteristics of an embedded system.	5
	c	With a block diagram, mention the components used in the design of a washing machine and also explain its working.	6
OR			
8	a	Compare DFG and CDFG with an example and diagrams.	4
	b	With FSM model, explain the design and operation of automatic tea/coffee vending machine.	5
	c	Explain the assembly language based embedded firmware development with a diagram and mention its advantages and disadvantages.	7
MODULE – 5			
9	a	Briefly explain the functions of the operating system, with a diagram.	4
	b	Describe preemptive SJF scheduling. Determine average turn around time and average waiting time, if processes P1 P2 and P3 with estimated completion time of 10, 5, 7 milliseconds enter ready queue together and later P4 with a completion time of 2 msec enters ready queue after 2 msec.	5
	c	With a state transition diagram, structure and memory organization of a process, describe the process state transitions.	7
OR			
10	a	Explain out of circuit and in-system programming methods for integration of hardware and firmware.	5
	b	With a diagram, mention the function of the components in an embedded system development environment.	5
	c	Explain simulator based debugging and ICE based target debugging techniques.	6

**Note: In the updated syllabus ‘Bus Interface’ topic in Module-2 has been replaced with ‘Bit-band operations.’**

\*\*\*\*\*