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FIRST INTERNAL ASSESSMENT

Sem: 6 | Sub: ARM Microcontroller & ES | Sub. Code:15EC62

Date: 05.03.18 | Time: 3pm to 4pm | Max. Marks: 25

Note: Answer two full questions, draw sketches wherever necessary.

Q. No		Discription of Question	Marks	CO	RBT Level
1	a	With neat block diagram, explain briefly ARM Cortex-M3 based MCU.	7	CO310.1	L1 L2
	b	Briefly explain Thumb2 technology.	6	CO310.1	L1 L2
		OR			
2	a	List the ARM Cortex-M3 processor application.	6	CO310.1	L1 L2
	b	With neat block diagram, explain ARM Cortex-M3 registers.	7	CO310.1	L1 L2
3	a	Explain operation modes of ARM Cortex-M3 with operation mode transations.	6	CO310.1	L1 L2
	b	Describe the ARM Cortex-M3 memory mapping.	6	CO310.1	L1 L2
		OR			
4	a	List the characteristics of ARM Cortex-M3.	6	CO310.1	L1 L2
	b	Draw the register format of xPSR & explain.	6	CO310.1	L1 L2

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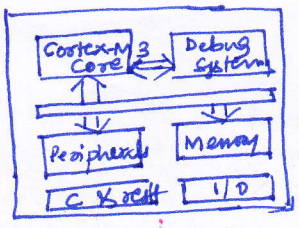
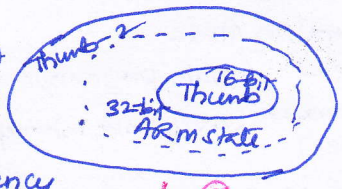
ECE Dept. | Exam. | IA Scheme Evaluation | Even Sem (2017-18)

SCHEME OF EVALUATION

Sem : 6 | Subject : ARM Microcontroller & ES | Sub Code : 15EC62 | Date : 05/03/18

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
1.	a.	 L4 • Cortex M3 processor based µC can easily programmed using C • support ARM thumb-2 Technology • 32-bit data path, Reg. bank, memory interface • Harvard Architecture. L3	7	CO3 10-1	L1 L2
	b.	Thumb-2 Technology ISA: • Cortex-M3 support the thumb-2 ISA • it allows 32-bit & 16-bit instructions to be used together for high code density & high performance efficiency. • In previous processors (CPU) had two operation states 32-bit ARM state & 16-bit thumb state. But thumb-2 had adv. over to as traditional. – No state switching overhead – No need to separate files of ARM state & thumb state – Powerfull instructions. L4  L2	6	310.1	L1 L2
2.	a.	List of CORTEX-M3 applications: • Low cost µc applications like toys. • Automotive Industry • Data Communications • Industry control • Consumer products. L6	6	310.1	L1 L2
	b.	Registers: R0 R1 R2 R3 . . R12 R13 (MSP) R13 (PSP) R14 LR R15 PC L4 • R0 to R12 are all General purpose registers. • R0-R7 Lows Reg. • R8-R15 High Reg. L3 MSP- Main stack pointer PSP- Process " LR- Link register PC- Program counter.	7	310.1	L1 L2

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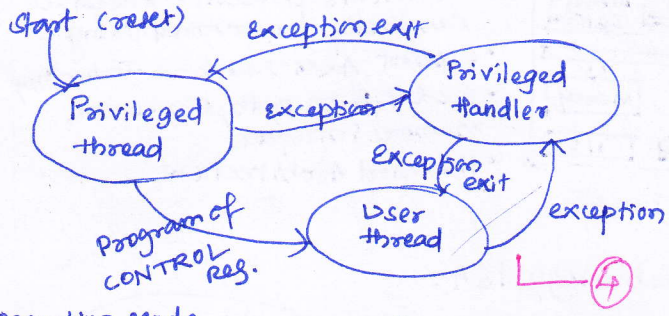
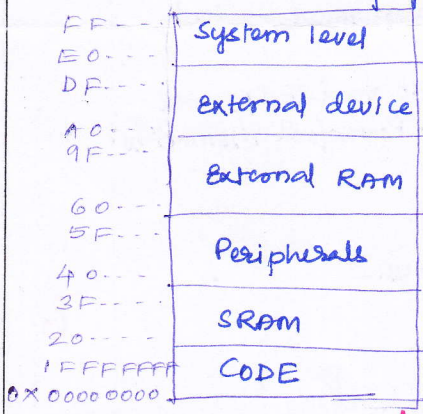
SCHEME OF EVALUATION

Sem : 6 | Subject : ARM µC & ES | Sub Code : 15EC62 | Date : 05/03/18

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
3.	a.	CORTEX M3 operation Modes:  (4) Operation Mode 1. Thread (Main program) 2. Handler (Exception or Interrupt) PRIVILEGE LEVEL 1. Privileged 2. User (2) Mechanism to safe gaurd memory & basic security model.	6	310.1	L1 L2
	b.	Memory MAP: 4 GB memory space can be divided into ranges.  Exp 2 (2) (4)	6	310.1	L1 L2
4.	a.	Characteristics: - High performance - Low power consumption - Debug supports. - Advanced Interrupt Handling feature - System Features (6)	6	310.1	L1 L2
	b.	xPSR 31 30 29 28 27 26:25 24 23:20 19:16 15:10 9 8:0 N Z C V Q ICI/IT T ICI/IT Exception number (4) PSR → APSR Application IPSR Interrupt EPSR Exception Exp 2 (2)	6	310.1	L1 L2

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Dept.
Exam.
Internal Assessment
Even Sem(2017-18)

SECOND INTERNAL ASSESSMENT

Sem: 6 | Sub: ARM Microcontroller & ES | Sub. Code:15EC62

Date: 11.04.18 | Time: 3pm to 4pm | Max. Marks: 25

Note: Answer two full questions, draw sketches wherever necessary.

Q. No		Discription of Question	Marks	CO	RBT Level
1	a	Explain the following instructions with example ASR, LSL, ROR & REV.	7	CO310.2	L1 L2 L3
	b	Write the memory map of Cortex M3 and Explain briefl bit-band operations.	6	CO310.2	L1 L2 L3
		OR			
2	a	Explain the following 16-bit instructions in Cortex M3 ADC, LDR, PUSH, AND, MRS & MSR.	6	CO310.2	L1 L2 L3
	b	With neat block diagram, explain the organization of CMSIS.	7	CO310.2	L1 L2 L3
3	a	Explain the 6 purposes of Embedded systems with an example for each.	6	CO310.3	L1 L2 L3
	b	Mention the applications of Embedded systems with an example for each .	6	CO310.3	L1 L2 L3
		OR			
4	a	Explain the components of typical Embedded systems in details.	6	CO310.3	L1 L2 L3
	b	Differentiate between General computing systems and Embedded systems.	6	CO310.3	L1 L2 L3

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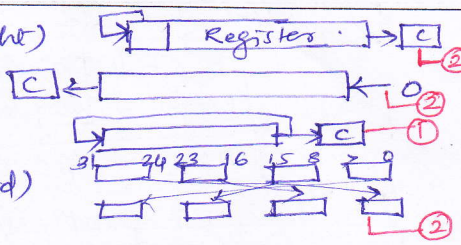
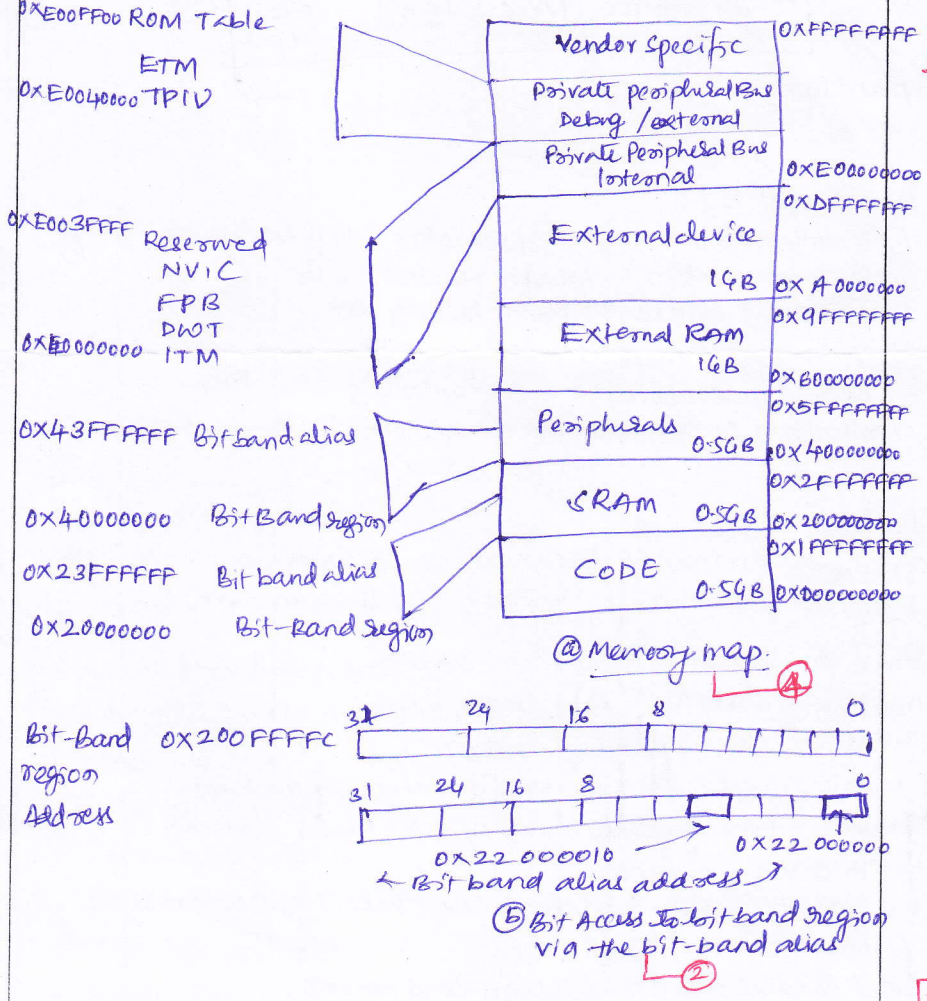
SCHEME OF EVALUATION

Sem : 6 | Subject : ARM Microcontroller & ES | Sub Code : 15EC62 | Date : 11/04/18

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
1	a.	ASR (Arithmatic shift Right) LSL (Logical shift left) ROR (Rotate Right) REV (Reverse byte in word) Example to each. 	7	310.2	L1 L2 L3
1	b.	 @ Memory map. (4) (5) Bit Access to bit band region via the bit-band alias (2)	6	310.2	L1 L2 L3
2	a.	ADC – ADD with carry, ADC Rd, Rn, Rm ; Rd = Rn + Rm + carry LDR – load word from memory to reg, LDR Rd, [Rn + # offset] PUSH – Push multiple reg., PUSH R1, R3, R5. AND – logical AND, AND R3, R7, R8 MRS – Move Reg. to special Reg., MRS R0, APSR MSR – Move Special Reg. to Reg., MSR APSR, R0 (1 each)	6	310.2	L1 L2 L3

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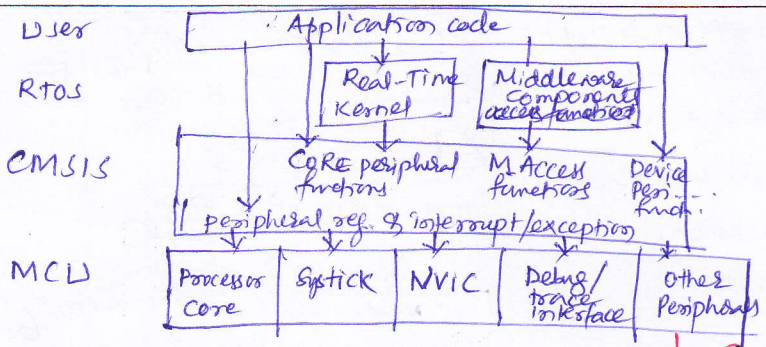
Even Sem (2017-18)

SCHEME OF EVALUATION

Sem : 6		Subject : ARM Microcontrollers & ES	Sub Code : 15EC62	Date : 11/04/18		
Q. No.	**Bit**	**Description**	**Marks**	**CO's**	**RBT LEVEL**	
2	b.	 Explanation (3)	7	310.2	L1 L2 L3	
3	a.	6 Purposes of ES: 1. Data collection / Storage / Representation : Digital camera. 2. Data communication : Wireless Network router 3. Data (signal) processing : Digital hearing Aid 4. Monitoring : Patient monitoring system 5. Control : Air conditioner for controlling room Temp. 6. Application specific user interface : Mobile, Running shoe. (1) each.	6	310.3	L1 L2 L3	
3	b.	Applications of ES: 1. Consumer electronics : Camcoders, Camera. 2. Household appliances : TV, DVD, washing machine 3. House automation & security : Air conditioner, CCTV 4. Automotive industry : ABS, Engine control 5. Telecom : cellular phones, handsets 6. Computer peripherals : Printers, Scanners, fax machines 7. Computer networking systems : switches, Hub, Router, firewalls 8. Health care : EEG, ECG, 9. Measurement & Instrumentation : CRO, PLC, Digital multimeter 10. Banking retail : ATM, POS 11. Card Readers : Barcode, Smart card readers, (1) each.	6	310.3	L1 L2 L3	

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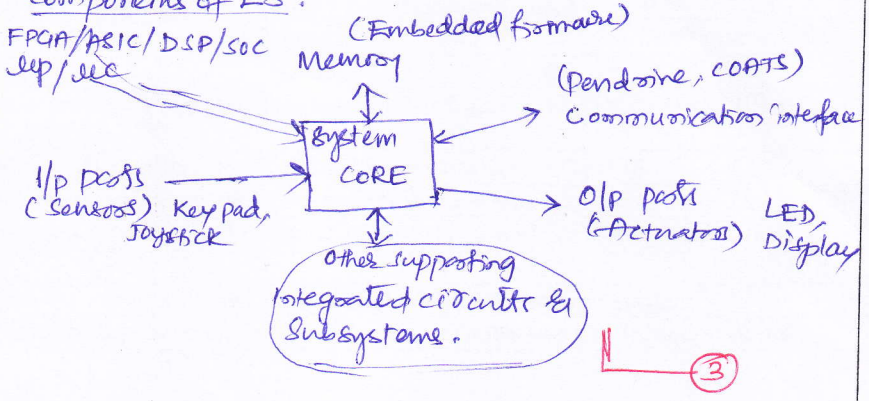
SCHEME OF EVALUATION

Sem : 6 | Subject : ARM Microcontrollers & ES | Sub Code : 15EC62 | Date : 11/04/18

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
4	a.	Components of ES:  Explanation 3	6	3.0.3	L1 L2 L3
4	b.	General computing system: 1. System is combination of generic H/w + general purpose OS for exe of variety of app 2. General OS 3. Applications are user alterable & OS can be are installed 4. processing speed is key factor in selection of system 5. Non-time critical 6. need not to be deterministic for the exe of behaviour 7. Power Savers. Embedded systems: 1. System is combination of specific S/w + Embedded OS for exe of the set of application 2. May or may not be contain Embedded OS 3. A firmware of ES is to be pre programmed & non user alterable 4. Application specific 5. Critical. 6. need to be deterministic for the exe of behaviour 7. More power saver. 1 each.	6	3.1.0.3	2 L2 L3

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THIRD INTERNAL ASSESSMENT

Sem: 6 | Sub: ARM Microcontroller & ES | Sub. Code:15EC62
Date: 18.05.18 | Time: 3pm to 4pm | Max. Marks: 25

Note: Answer two full questions, draw sketches wherever necessary.

Q. No		Discription of Question	Marks	CO	RBT Level
1	a	**Explain the different characteristics of Embedded sysem in deail.**	7	CO310.4	L1 L2 L3
	b	**Wha is operational quality attribute? Explain the important operational quality attribute to be considered in any Embedded system design.**	6	CO310.4	L1 L2 L3
		OR			
2	a	**Explain the important non-operational quality attribute.**	7	CO310.4	L1 L2 L3
	b	**With block diagram, mention the components used in the design of a washing machine and also explain its working.**	6	CO310.4	L1 L2 L3
3	a	**Briefly explain the functions of the operating system, with a diagram.**	6	CO310.5	L1 L2 L3
	b	**Explain the multiprocessing, multitasking and multiprogramming.**	6	CO310.5	L1 L2 L3
		OR			
4	a	**What is RTOS? How to chose an RTOS.**	6	CO310.5	L1 L2 L3
	b	**Differentiate between Thread and Process.**	6	CO310.5	L1 L2 L3

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SCHEME OF EVALUATION IA- III

Sem : 6 | Subject : ARM MC & ES | Sub Code : 15EC62 | Date : 18/05/2018

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
1	a)	Characteristics of an Embedded Systems: 1. Application & Domain specific Ex. cannot replace CD of Microwave oven with Air conditioner. 2. Reactive and Real time: Ex. ABS 3. Operates in Harsh Environment: Ex. high shock, Power fluctuations, corrosion, aging 4. Distributed : Ex. Vending Machine, ATM 5. Small size and weight: Ex. product aesthetics (size, weight, shape, style etc) 6. Power Concerns: Ex. Power saving modes.	[7]	310.4	L1 L2 L3
	b)	Operational Quality attributes: 1. Response: Response is a measure of quickness of the system. 2. Throughput: deals with efficiency of the system. 3. Reliability: is a measure of how much % you can rely upon the proper functioning of the system. 4. Maintainability: deals with support & maintenance 5. Security: 6. safety: deals with the possible damage.	[6]	310.4	L1 L2 L3
2.	a)	Non-operational Quality attributes: 1. Testability & Debug-ability: deals with how easily one can test his/her design, application and by which means he/she can test it. 2. Evolvability: embedded product can be modified to take advantage of new firmware or hardware technologies. 3. Portability: is a measure of 'system independance' 4. Time-to-prototype and market: is the time elapsed between the conceptualisation of the product and the time at which the product is ready for selling. 5. Per unit cost and Revenue:	[7]	310.4	L1 L2 L3
	b)	Washing Machine – Application specific ES: An ES contains sensors, actuators, Control unit and application specific user interface like keyboards, display unit etc.	[6]	310.4	L1 L2 L3

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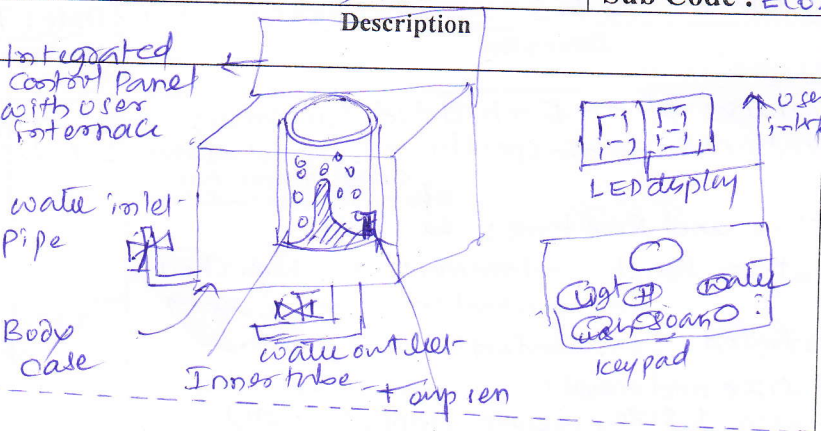
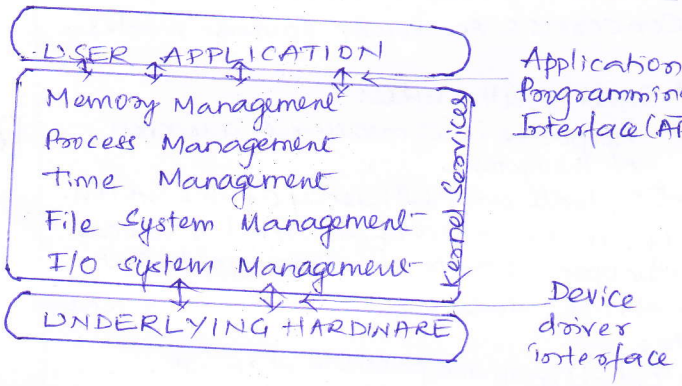
SCHEME OF EVALUATION IA-1

Sem : 6 | Subject : ARM MC & ES | Sub Code : 15EC62 | Date : 18/05/2018

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
					
3.	a)	 Explain.	[6]	3,10,5	L1 L2 L3
	b)	→ The ability of the operating system to have multiple programs in memory, which are ready for execution, is referred as multi-programming → The ability of an operating system to hold multiple processes in memory and switch the processor (CPU) from executing one process to another process is known as multitasking. → Multiprocessing describes the ability to execute multiple processes simultaneously.			

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SCHEME OF EVALUATION IA-

Sem : 6 | Subject : ARM MC & ES | Sub Code : 15EC62 | Date : 18/05/2018

Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
4.	a)	A Real-Time Operating System (RTOS) is an Operating System (OS) intended to serve real-time application that process data as it comes in, typically without buffer delays. Processing time requirements (including any OS delay) are measured in tenths of seconds or shorter increments of time. Functional Requirements: • Processor support • Memory requirements • Real-time Capabilities • Kernel and Interrupt Latency • Inter process communication and Task Synchronisation • Multitasking Support • Support for Networking & Communication • Development Lang. Support. Non Functional req't: • Custom development or off the shelf • Cost • Development and Debugging Tools Availability • Ease of use • After Sales	[6]	310.5	L1 L2 L3
	b)	**Thread** • Thread is also called light weight Process. • OS is not required for thread switching • One thread can read, write or even completely clean another thread stack • All threads can share same set of open files & child processes. • Uses fewer resources **Process** • Process is also called heavy weight process. • OS Interface is required for process switching • Each process operates independently of the other process. • In multiple processing each process executes the same code but has its own memory and file resources • Uses more resources.	[6]	310.5	L1 L2 L3

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