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CBCS Scheme

USN | | | | | | | | | | |

15EC62

Sixth Semester B.E. Degree Examination, June/July 2018
ARM Microcontroller & Embedded Systems

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. With a neat diagram, explain the architecture of ARM cortex M3 microcontroller. **(10 Marks)**

b. Explain the register organization of Cortex M3. **(06 Marks)**

OR

2 a. Explain the operation modes and privilege levels available in ARM cortex M3 with a neat transition diagram. **(06 Marks)**

b. Mention the instructions used for accessing the special registers. Explain the same using suitable examples. **(04 Marks)**

c. Explain the stack operations using Push and Pop instructions in ARM Cortex M3. **(06 Marks)**

Module-2

3 a. Explain shift and Rotate instructions available in ARM Cortex M3 instruction set. Why is there rotate right instruction but no rotate left instruction in Cortex M3? **(08 Marks)**

b. Explain the following instructions with suitable example:
(i) BFC (ii) SXTH (iii) UBFX (iv) RBIT **(08 Marks)**

OR

4 a. Write the memory map and explain memory access attributes in Cortex M3. **(08 Marks)**

b. Analyse the following instructions and write the contents of the registers after the execution of each instruction:
Assume R8 = 0x00000088, R9 = 0x00000006 and R3 = 0x00001111
(i) RSB.W R8, R9, #0x10
(ii) ADD R8, R9, R3
(iii) BIC.W R6, R8, #0x06
(iv) ORR R8, R9 **(08 Marks)**

Module-3

5 a. Differentiate between:
(i) RISC and CISC architecture.
(ii) Little Endian and Big Endian architecture. **(08 Marks)**

b. What are the features of the following:
(i) I2C bus
(ii) IrDA
(iii) Optocoupler
(iv) 1-wire interface **(08 Marks)**

OR

6 a. What are the different types of memories used in Embedded system design? Explain the role of each. **(08 Marks)**

b. Explain the following circuits in an embedded system :
(i) Brown-out protection unit.
(ii) Reset circuit. **(08 Marks)**

Module-4

7 a. Explain the term quality attributes in an embedded system development context. What are the different quality attributes to be considered in an embedded system design. **(08 Marks)**

b. Explain Data flow graph and control data flow graph models in the embedded design. **(08 Marks)**

OR

8 a. Explain the different 'Embedded firmware design' approach in detail. **(08 Marks)**

b. Explain the characteristics of an Embedded system. **(08 Marks)**

Module-5

9 a. Explain the concept of 'deadlock' with a neat diagram. Mention the different conditions which favours a deadlock situation. **(08 Marks)**

b. Write a block schematic of IDE environment for embedded system design and explain their functions in brief. **(08 Marks)**

OR

10 a. Three processes with process IDs P_1, P_2, P_3 with estimated completion time 10, 5, 7 milliseconds respectively enters the ready queue together. A new process P_4 with estimated completion time 2 ms enters the 'Ready' queue after 2 ms. Calculate the waiting time for all the processes and the turn around time for all the processes. Also, calculate the average waiting time and average turn around time. The algorithm used is SJF (Shortest Job First) based preemptive scheduling. Assume all the process contain only CPU operation and no I/O operation are involved. **(08 Marks)**

b. Mention the sequence of operations for embedding the firmware with a programmer and draw the interfacing diagram. **(08 Marks)**

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