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B.E/B.Tech (Full Time) DEGREE EXAMINATION, APR/MAY 2013
(Sixth Semester)
(Electronics and Communication Engineering)
EC 9078 – EMBEDDED AND REALTIME SYSTEMS
(Regulation 2008)

45

Time: **Three hours**

Answer **ALL** questions

Maximum: **100 marks**

PART- A

(10 * 2 = 20 marks)

1. List out the important characteristics of embedded computing applications.
2. Mention the steps followed by an ARM7 processor when responding to an interrupt.
3. Draw the timing diagram for a burst read transaction.
4. Generate the symbol table for the following ARM assembly code block:
ORG 100
label1 ADR r4,c
 LDR r0,[r4]
label2 ADR r4,d
 LDR r1,[r4]
label3 SUB r0,r0,r1
5. Define the periodic and aperiodic processes with respect to their release times and deadlines with a neat diagram.
6. What is meant by 'predictive shutdown'?
7. "Accelerator is not a coprocessor" – Justify the statement
8. Draw the IP packet structure.
9. What is meant by the term "concurrent engineering"?
10. Draw the UML sequence diagram for a set speed command received by the train.

PART- B

(5 * 16 = 80 marks)

- 11.(i) Explain the theory of operation of a software modem. Also make a note about the requirements, specification and system architecture stages in designing of a software modem. (8)
 - (ii) With neat sketches, explain the hardware and software architectures of set-top box in detail. (8)
 - 12.a)(i) Draw the ARM core dataflow model and explain the functionality of each block in detail. (8)
 - (ii) Bring out the difference between exception and trap. (4)
 - (iii) Explain the busy wait I/O with an example. (4)
- (OR)**
- 12.b)(i) Explain the seven basic operating modes of the ARM processor and also mention about the visible and invisible registers in each operating mode. (8)
 - (ii) With a neat diagram, explain the ARM two stage address translation. (8)
- 13.a)(i) What is the need for having a "bridge"? Explain the bus bridge operation with the help of a UML state diagram. (8)
 - (ii) Explain briefly the various techniques used for validating and testing a program with relevant examples. (8)

(OR)

(P.T.O)

- 13.b)(i) Differentiate between loop transformation technique and loop optimization technique. With necessary examples, explain the various methods used in loop transformation. (8)
- (ii) With a neat diagram, explain the working of a resistive touch screen. (4)
- (iii) Bring out the difference between an interpreter and JIT compiler. (4)

- 14.a)(i) With neat sketches, explain the two major styles of interprocess communication. (10)
- (ii) Briefly explain the five basic global power states supported by Advanced Configuration and Power Interface (ACPI) with a neat diagram. (6)

(OR)

- 14.b) For the periodic process shown below:
- (i) Schedule the process using static scheduling algorithm (8)
- (ii) Schedule the process using EDF policy (8)
- In each case, compute the schedule for an interval equal to the hyperperiod of the processes. Assume the time starts at $t=0$.

Process	CPU Time	Deadline
P1	1	3
P2	1	4
P3	1	12

- 15.a)(i) Explain briefly about the cache updating problem in an accelerated system with a neat diagram. Also explain how the cache updating problem could be resolved. (8)
- (ii) With a neat diagram, explain the features and functionality of SHARC link port. (8)

(OR)

- 15.b)(i) Explain in detail about the working of a CAN bus with respect to the physical and electrical organization. Draw the CAN data frame format and explain the various fields in it. (10)
- (ii) Bring out the difference between the CAN bus and Ethernet by briefly explaining with respect to their arbitration techniques. (6)
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