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10EC118

M.Tech. Degree Examination, June 2012
Advanced Embedded Systems

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Distinguish between :
i) Harvard architecture and Von-Neumann architecture.
ii) Microprocessors and Microcontrollers. **(08 Marks)**

b. Explain the following terms:
i) Big-endian format
ii) EPROM
iii) Optocoupler
iv) Reset circuit **(08 Marks)**

c. Determine the resolution and range of a 16 bit timer working at a clock frequency of 20 MHz. What is the terminal count to be loaded for an upcounter for generating a delay of 500 microseconds? **(04 Marks)**

2 a. Describe any four characteristics of an embedded system and any four operational quality attributes of an embedded system. **(08 Marks)**

b. Explain the following terms:
i) PLD ii) DRAM iii) Push button switch and iv) SPI bus **(08 Marks)**

c. Compare I^2C bus with W_i - F_i. **(04 Marks)**

3 a. Explain FSM for coin operated telephone unit and a sequential program model for seat belt warning system, with diagrams. **(08 Marks)**

b. Describe UML building blocks and relations. **(08 Marks)**

c. Compare DFG and CDFG. **(04 Marks)**

4 a. Explain assembly language to machine language conversion process. What are the advantages of assembly language based developments? **(08 Marks)**

b. Describe superloop based and embedded OS based approaches for embedded firmware design. **(08 Marks)**

c. Compare i) C and Embedded C and ii) Compiler and Cross compiler. **(04 Marks)**

5 a. What is a real time kernel? Describe the basic functions of real time kernel. **(08 Marks)**

b. There are 3 processes P_1, P_2 and P_3 with estimated completion / execution time 10, 5 and 7 milliseconds. Determine the waiting time and TAT for each process and average WT, query ET and average TAT for SJF algorithm. Compare SJF with FIFO scheduling technique. **(08 Marks)**

c. Differentiate between threads and processes. **(04 Marks)**

6 a. Describe the structure of a process, memory organization, process status and state transition with diagram. **(08 Marks)**

b. Three processes P_1, P_2 and P_3 with estimated completion / execution time 10, 5 and 7 milliseconds with priorities 1, 3, 2 respectively enters the ready queue at time 0. A process P_4 with priority 0 enters ready queue after 5 msec and its estimated completion time is 6 msec. (Priority 0-highest and priority 3-lowest). Determine average WT, average ET and average TAT. Also compare preemption and non-preemptive scheduling techniques. **(08 Marks)**

c. Define :i) Mailbox ii) Message queues iii) Micro kernel and iv) RPC. **(04 Marks)**

7 a. Write the block diagram for IDE and define the various units used in the embedded system design. **(08 Marks)**

b. Describe the various files generated during cross compilation. **(08 Marks)**

c. Explain boundary scan principle. **(04 Marks)**

8 a. Describe any two processors and any two languages which are recently used for embedded developments. **(08 Marks)**

b. Explain the functional and non-functional requirements for choosing an RTOS. **(08 Marks)**

c. Mention the open source standards and frameworks for mobile handset industry. **(04 Marks)**

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