

- Q.2** a. Mention design metrics of an embedded system. Differentiate the following:
- (i) General-purpose processors
 - (ii) Single purpose processors
 - (iii) Application-specific processors

Answer: Page Number 4-5 & 9-12 of Text Book I

- b. Give the sequence of steps to optimize the datapath and FSM in custom single purpose processors.

Answer: Page Number 47-50 of Text Book I

- c. Mention RTL sequential and combinational components.

Answer: Page Number 33-35 of Text Book I

- Q.3** a. Explain various stages of instruction execution in a microprocessor. Give an illustration for non-pipelined and pipelined instruction execution.

Answer: Page Number 59-60 of Text Book I

- b. Explain the significance of FSM in simple general purpose microprocessor with the help of diagram.

Answer: Page Number 77-80 of Text Book I

- c. Mention features of Digital Signal Processors (DSP) as ASIPs.

Answer: Page Number 74-75 of Text Book I

- Q.4** a. Explain the working of Pulse Width Modulators (PWM). Give the calculations for 25%, 50% and 75% duty cycles in PWM.

Answer: Page Number 92-93 & 77-80 of Text Book I

- b. For an analog output signal whose voltage range is from 0 to 10 V and an 5-bit digital encoding, calculate the encodings for :

- (i) 2.25 V
- (ii) 5.75 V
- (iii) 7 V

Answer: (i) 01001 (ii) 10111 (iii) 11100

- c. Explain briefly the working of real-time clock in an embedding system.

Answer: Page Number 105-106 of Text Book I

- Q.5** a. Compare the following and give their respective applications:

- (i) ROM
- (ii) Mask ROM
- (iii) One-time Programmable ROM

Answer: Page Number 112-115 of Text Book I

- b. Give the block diagram of 4×4 RAM. Draw the memory cell internals for SRAM and DRAM.

Answer: Page Number 118-119 of Text Book I

- c. Explain any two cache mapping techniques.

Answer: Page Number 126-128 of Text Book I

- Q.6** a. Draw the transition diagram for task states.

Answer: Page Number 159-162 of Text Book II

- b. Define reentrancy. Mention three rules to decide if a function is reentrant.

Answer: Page Number 168-170 of Text Book II

- c. How do semaphores address the problems like priority inversion and the deadly embrace? Give an example for illustration.

Answer: Page Number 184-187 of Text Book II

Q.7 Write short notes on any **FOUR** of the following:

- (i) Strobe and handshake protocols
- (ii) Memory mapped I/O and standard I/O
- (iii) Multi-level bus architecture
- (iv) I²C serial protocol and PCI bus parallel protocol
- (v) Wireless Protocols (IrDA, Blue Tooth and IEEE 802.11)

Answer:

- (i) Page Number 141-142 of Text Book I**
- (ii) Page Number 145-146 of Text Book I**
- (iii) Page Number 164-165 of Text Book I**
- (iv) Page Number 169-173 of Text Book I**
- (v) Page Number 174-175 of Text Book I**

- Q.8** a. Explain the interrupt routine in RTOS. Give the working of interrupts for ISR, RTOS, TaskHigh and TaskLow.

Answer: Page Number 219-225 of Text Book II

- b. Explain the role of message queues, mailbox and pipes in RTOS interprocess communication. Give their respective advantages and disadvantages.

Answer: Page Number 193-204 of Text Book II

- c. Explain the role to timer function and events in RTOS. Give an example for illustration.

Answer: Page Number 205-213 of Text Book II

- Q.9** a. Explain the features of hard real-time scheduling and soft real-time scheduling. Give an example for illustration.

Answer: Page Number 273-274 of Text Book II

- b. Mention any four power saving techniques in RTOS.

Answer: Page Number 277-279 of Text Book II

- c. Design an application to illustrate RTOS. Give the block diagram and label various design components of RTOS.

Answer: Page Number 264-266 of Text Book II

Text Books

1. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid/Tony Givargis, 2006 reprint, John Wiley Student Edition
2. An Embedded Software Primer, David E. Simon, Fourth Impression 2007, Pearson Education