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 FSMD 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) I^2C 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