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B.E DEGREE EXAMINATIONS: APRIL/MAY 2016

(Regulation 2009)

Eighth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE147**:** Embedded Systems

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. 1 Identify which of these are real-time applications scenarios:

   a) An on-line bus ticketing system
   b) Printing of annual report of a company's annual report

   c) Reconciling a day's transactions in an account book of a small company
   d) An aircrafts' yaw control system

2. An embedded system hardware can

   a) have microprocessor or microcontroller or single purpose processor
   b) have digital signal processor

   c) one or several microprocessor or microcontroller or digital signal processor or single purpose processors
   d) not have single purpose processor (s)

3. A communication protocol specifies (i) the ways of communication of signals on the bus (ii) ways of arbitration when several devices need to communicate through the bus or the ways of polling from the devices need of the bus at an instance (iii) memory requirement during communication (iv) minimum rate of data transfer during communication (v) interrupt service mechanism.

   a) i, ii, iii and iv
   b) i, iii, iv and v

   c) i and ii
   d) i, ii and iii

4. A system might be connected to a number of other devices and systems. (i) A bus consists of a common set of lines to connect multiple devices, hardware units and systems (ii) A bus is used for communication between two of these at any given instance. (iii) A bus is used for

communication between all of these at the same instance (iv) A bus may be serial bus or parallel bus to transfer one bit or multiple data bits at an instance, respectively.

a) i, ii and iv are correct
b) iii is correct
c) iii and iv are correct
d) all are correct.

5. PIC microcontroller has _____ bits of program memory address.

a) 8
b) 16
c) 13
d) 24

6. PIC 16C74A microcontroller has _____ vectored interrupt location but has _____ interrupt sources.

a) 1, 6
b) 1,12
c) 2, 6
d) 2, 12

7. Which of the following describes the RTOS design philiosophy best

a) Maximize the throughput of the system
b) Minimizing the response time
c) Maximize the processor utilization
d) Response within certain stipulated time period

8. Which of the following strategy is employed for overcoming the priority inversion problem?

a) Abandon the notion of priorities altogether
b) Have only two priority levels
c) Allow for temporarily raising the priority of lower level priority process
d) Use pre-emptive policies strictly based on priorities

9. Where are the device drivers located in RTOSs with a microkernel:

a) In the kernel space
b) In the user space
c) In separately allocated space which is neither kernel space nor user space.
d) External flash ROM

10. Design metrics are (i) engineering cost (ii) time to market (iii) power dissipation (iv) flexibility (v) system and user safety (vi) performance (vii) prototype development time (viii) maintenance of the system.

a) all
b) all except v and viii
c) iii and vi
d) all except i and ii

PART B (10 x 2 = 20 Marks)

11. List the factors to be considered while evaluating the processor for embedded system

12. What is meant by cross platform development?

13. What is a CAN bus? Where is it used?

14. Name the four types of data transfer used in USB.

15. List the reset actions that takes place in PIC microcontroller.

16. Mention the functions of two I/O ports of PIC microcontroller

17. What are the problems that may arise while using semaphores?

18. Is it necessary to have a hardware timer device in a system? How does it work?

19. Name the two types of scheduling supported by MUCOS.

20. Name at least four important RTOS used in embedded systems.

PART C (5 x 14 = 70 Marks)

21. a) i   Explain the components of embedded systems   (7)

    ii   Name the three processor architectures in embedded systems. Compare their (7)
         performances in designing an embedded system.

(OR)

    b)   Explain the different program layers in the embedded software and also the
         process of converting a "C" program into the file for ROM image with suitable
         block diagrams.

22. a) i   Describe the functions of a typical parallel I/O interface with a neat diagram   (7)

    ii   Explain the synchronous and asynchronous communications from serial devices (7)

(OR)

    b) i   Explain the signals used during a transfer of a byte when using the I^2C bus and (7)
         also specify the format of the bits at the I^2C bus with diagrams.

    ii   Explain the following parallel communication devices: (7)
         i) ISA bus
         ii) PCI and PCI/X

23. a)   Draw the architecture of PIC 16C6X/7X microcontroller. Explain the arithmetic-
         logic unit, working register and status register, Interrupts and I/O ports of this
         microcontroller.

(OR)

    b)   Mention the addressing modes of PIC 16C6X/7X microcontroller. Explain each
         addressing mode with an example.

24. a) i   Explain how critical section in handled by a pre-emptive scheduler   (7)

    ii   Write about Interrupt Service Handling in RTOS.   (7)

(OR)

b)   Explain the strategy for synchronization between the processes, ISRs, OS functions and tasks for resource management.

25. a) i   List and explain the various task service functions in MUCOS-II.   (7)

          ii   How does an RTOS semaphore protect data? Explain by giving an example.   (7)

(OR)

b)   Design an embedded system application to create a Smart Card and explain your design.

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