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Total Number of Pages : 03

B.Tech.
PIT6D001

6th Semester Regular Examination 2017-18
EMBEDDED SYSTEMS
BRANCH : IT
Time : 3 Hours
Max Marks : 100
Q.CODE : C513

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

- Q1 Answer the following questions: *multiple type or dash fill up type* : (2 x 10)**
- a) An _____ translates the high level language into machine codes.
 - b) Example of RISC processor _____.
 - c) What is the value of maximum data rate in RS 232 standard?
 - a. 20 kb/s
 - b. 40 kb/s
 - c. 80 kb/s
 - d. 100 kb/s
 - d) While designing an embedded system, which sub-task oriented process allocates the time steps for various modules that share the similar resources?
 - a. Simulation and Validation
 - b. Iteration
 - c. Hardware-Software Partitioning
 - d. Scheduling
 - e) 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
 - f) In CPU structure, where is one of the operand provided by an accumulator in order to store the result?
 - a. Control Unit
 - b. Arithmetic Logic Unit
 - c. Memory Unit
 - d. Output Unit
 - g) In the branch instructions of ARM, what does the mnemonic BVC imply?
 - a. Overflow Set
 - b. Carry Set
 - c. Carry Clear
 - d. Overflow Clear
 - h) Scheduling of tasks is a very important consideration in RTOS. Which of the following best described the scheduling policy design:
 - a. The scheduler must follow a pre-emptive policy
 - b. The scheduler must not use pre-emptive policy option
 - c. The scheduler must not only use pre-emptive policy options with the priority considerations.
 - d. The scheduler must not use pre-emptive policy option, but must employ priority consideration.

- i) Describe which of these scheduling policies is most suited for controlling a set of periodic tasks.
 - a. FCFS
 - b. Least laxity first
 - c. Earliest dead line first
 - d. Rate monotonic policy schedule
- j) 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.

Q2 Answer the following questions: *Short answer type* : (2 x 10)

- a) What is the need of device driver in Embedded system?
- b) Differentiate between power-up reset and watchdog-timer reset?
- c) Define the term general purpose processor with proper examples.
- d) When do we need an RTOS?
- e) What is preprocessor directive?
- f) What is the backtracking method for debugging?
- g) Discuss the various control signals in a typical RAM device.
- h) Explain the basic difference between the characteristics of a real-time task scheduling algorithm for multiprocessors and a real-time task scheduling algorithm for applications running on distributed systems.
- i) What are the types of Event Driven Schedulers?
- j) What is unique feature of CAN protocol?

Part – B (Answer any four questions)

- Q3** a) Explain the different functions of embedded operating systems? (10)
 - b) What is an embedded system? What is the purpose of watchdog timer in embedded application? (5)
- Q4** a) Three hard real-time periodic tasks $T_1 = (50, 100, 100)$, $T_2 = (70, 200, 200)$, and $T_3 = (60, 400, 400)$ [time in msec] are to be scheduled on a uniprocessor using Rate Monotonic Algorithm (RMA). Can the task set be feasibly be scheduled? Suppose context switch overhead of 1 millisecond is to be taken into account, determine the schedulability. (10)
 - b) Draw and explain the circuit diagram for interfacing an IrDA receiver with a typical microcontroller (5)
- Q5** a) Consider the following three periodic real-time tasks to be scheduled using Earliest Deadline First scheduling (EDF) on a uniprocessor: $T_1 = (e_1=10, p_1=20)$, $T_2 = (e_2=5, p_2=50)$, $T_3 = (e_3=10, p_3=35)$. Determine whether the task set is schedulable.. (10)
 - b) Using a block diagram show the important hardware components of a real-time system and their interactions. Explain the roles of the different components. (5)
- Q6** a) Write short notes on (10)
 - i) 232 standard
 - ii) CAN Bus
 - iii) Inter integrated circuit bus
 - b) What is an emulator? What are the various components of an emulator? (5)
- Q7** a) Explain the terminologies semaphores, Mail box, pipes and shared memory in RTOS. (10)
 - b) Explain the software-hardware trade off? (5)

- Q8** a) Elucidate the selection of processor and memory for any one embedded applications with suitable diagram in detail. **(10)**
- b) With the help of suitable examples describe following C programming elements. **(5)**
- i) Header file
 - ii) Modifier
- Q9** a) List the data transfer instructions in ARM7 processor. Write a program to add three numbers and store the result. **(10)**
- b) Explain Thumb mode of ARM7TDMI core and compare it with normal mode. **(5)**