BPUT/B.Tech./8THSEM/CSE/2009 *PECS-3405*

Embedded Systems

Time – 3 Hours *Marks – 70*

Answer Question No.1 which is compulsory and any five from the rest. The figures in the right-hand margin indicate full marks for the questions.

1 *Answer the following Questions:-* 2X10

a *Name at least 4(four) different type of processors that can be used as the core of an embedded system.*

b *What is a charge pump? Give at least one example where charge pump is used.*

c *What is index register and segment register?*

d *Explain the use of each control bit of I^2C bus.*

e *What are Virtual Devices? Give two examples of virtual devices.*

f *What are the advantages of re-entrant functions in embedded system software?*

g *List and justify two most important functions of kernel.*

h *When are RPCs used? List two examples.*

i *Explain the term context switching.*

j *What do you understand by "Priority Inversion"? Mention one situation where priority inversion can occur*

2

a *Draw the block diagram of structural units of a processor in the embedded system and list the common units in most processors.* 4

b *With the help of suitable diagrams explain how the following data structures are stored in memory:* 6

1. *Stack*
2. *Circular Queue*

3

a *A 16bit counter is getting inputs from an internal clock at 12MHz. There is a pre-scaling circuit, which pre-scales by a factor of 16.* 6
What are the time intervals at which overflow interrupts will occur from this timer?
What will be the period before which these interrupts must be serviced?

b *What are the advantages and disadvantages of negative acknowledgement?* 4

4			
	a	*Write the algorithm for a serial UART device driver in a system using POSIX defined functions.*	5
	b	*Explain how do you write physical device driving ISRs in a system?* *List all the steps involved.*	5
5			
	a	*What are the features of UML?* *Draw the sequence diagram for the automatic chocolate vending machine sequence states.*	4
	b	*What are the analogies between process, task and thread?* *List out all the differences between process, task and thread, Also state how the functions differ from ISRs, tasks, threads and processes.*	6
6			
	a	*State at least 4 MUCOS functions with their important features. When do you use OS_ENTER_CRITICAL ( ) and OS_EXIT_CRITICAL ( ) in MUCOS ?*	6
	b	*Explain how prototype development tools and IDE (Integrated Development Environment) can be used to develop sophisticated embedded systems with simpler efforts.*	4
7			
	a	*Smart Cards are one of the most used systems today in the area of secure SoC systems.* *List all the special features required in the OS to implement the embedded software in the smart card.*	5
	b	*Explain the software-hardware tradeoff.* *What are the advantages and disadvantages of software implementation instead of hardware implementation in embedded system design?*	5
8		*Write short notes on any two of the following*	5X2
	a	*Hardware Software Co-Design*	
	b	*Network OS*	
	c	*Interrupt Servicing Mechanism in an embedded system*	
	d	*Multiple task scheduling in real time RTOS.*	

~ All The Best ~