**PRINCIPLES & APPLICATIONS OF EMBEDDED SYSTEMS**

**Important questions for 3 units**

UNIT –1

Syllabus

Embedded Computing: Introduction, Complex Systems and Microprocessor; Embedded

System Design Process, Formalisms for System Design, Design Examples. Instruction Set: Preliminaries, ARM Processor

Text Book: Computers as Components Principles of Embedded Computing System Design-Wayne Wolf

Part-A(University Questions)

1. Difference between Von Neumann and Harvard Architectures.Nov-2013, dec2015
2. Write the characteristics of an instruction set.Nov-2013
3. Write the H/W architecture of typical computing platform.Nov-2013
4. What is the difference between Big-endian and little –endian portability? Jul-2014
5. Distinguish between Microprocessors and Microcontrollers .July-2014, June 2016
6. Write any three differences between embedded system and a personal computer.Dec-2014
7. What is a Load Store Architecture .why ARM processor follows this architecture.Dec-2014
8. What is the purpose and format of CPSR in ARM Processor July-2015/Dec2015
9. Define Trap, Supervisor mode. July-2015, Dec2015
10. Write the stages in ARM 7 Pipeline.July-2015
11. List the differences between CISC and RISC architecture. July-2015, .June2016
12. What is Trap and common use of Trap. Dec2015
13. What is Branch Penalty Dec2015
14. Define Embedded system? List down applications of it? Dec 2016
15. Use ARM instructions to write a programs for Y=m\*x+c. Dec 2016
16. Write a sample requirement form for Model train control system. June2016
17. Explain the basic ARM programming model.June2016

Part-B(University Questions)

1. What are the characteristics of embedded system applications? Explain.

Nov-2013,July-2014,Dec-2015,June-2016,Dec-2016

1. Explain Top-down and bottom up approach of an embedded system design process with example Nov-2013
2. Explain the details for requirements and specifications of model train controller.July-2014
3. Explain various phases of the embedded system design process with dynamic traffic controller example. Dec-2014
4. Explain various challenges of embedded computing system design.Dec-2014,July-2015
5. Explain the details for requirements, specification and design process of GPS moving map July-2015,Dec-2016
6. Explain the design process of Embedded system design, with suitable example.Dec-2015
7. Explain about the formalisms for system design.June-2016

Unit 2

Syllabus

CPU's:Programming Input and output.Supervisor mode, exceptions, traps,Co-processors, Memory system Mechanisms, CPU Performance, CPU Power Consumption Computing Platforms:Basic Computing Platforms,the CPU bus,memory device and system,consumer electronics architecture,platform level performance analysis ,design example.

Text Book: Computers as Components Principles of Embedded Computing System Design-Wayne Wolf

Part-A(University Questions)

1. Write the steps in 4-cycle Hand-shake Protocol used for Bus organization.Nov-2013
2. Define Co-processor, Unified Cache Memory and its uses? Jul-2014, Dec-2014, Dec2016, June2016
3. Write the advantages of Interrupt over Busy –Wait I/O? Jul-2014
4. Write the differences between maskable and non maskable interrupt. Give example for each. Dec-2014
5. Draw a bus with a DMA controller and explain briefly. Dec2015
6. Write the uses of multilevel caches for a high performance computing systems. Dec2016
7. What is data stall in pipelining? June2016
8. What are the elements of AMBA bus? Explain with diagram.June2016

Part-B(University Questions)

1. Explain the advantages of interrupts driven I/O over busy wait I/O with suitable I/O program.Nov2013,dec-2015
2. Explain the process of BUS read and write by DMA with timing diagram.Nov-2013
3. Write the following procedure call using ARM instructions.Nov-2013

Void f2(intx)

{

Int y;

y=y+1;

}

Void f1(int a)

{

f(a);

}

1. Explain Memory Management Units and various address translation Mechanisms in advanced processors.July-2014, Dec-2015, June-2016
2. What is DMA how can the concurrency achieved during DMA process with example.July-2014,Dec-2014, July-2015
3. Explain Memory organization in ARM and SHARC Processor.July-2014
4. Write short notes on Multiple Interrupts July-2014
5. Explain the two factors to be considered to improve the CPU performance in embedded systems.Dec-2014
6. Implement the following statement in ARM. Dec-2014

If(a>b)

{

X=5;

Y=c+d;

}

1. Explain an I/O interface for copying the characters from input to output with interrupts and buffers.July-2015, June-2016
2. Explain cache mechanism and different types of Cache Misses and cache memory organization.Dec-2015
3. Explain about interrupt priorities and interrupt vectors.June-2016.
4. Explain about interrupt overhead.June-2016

Unit 3

Syllabus

Introduction to Real-Time Operating Systems:Tasks and Task States, Tasks and Data, Semaphores, Shared Data, Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, InterruptRoutines in an RTOS Environment.

Basic Design Using a Real-Time Operating System: Principles, Semaphores and

Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An

example RTOS like UC-OS(Open Source).

Text Book: An Embedded Software Primer, David E.Simor,Pearson Education Chapter:6,7,8

Part-A(University Questions)

1. What is priority inversion? Write the uses of it? Nov-2013
2. List the difference between the
   1. a)task scheduler and dispatcher b) task scheduling and Resource Monitoring-

Dec-2014, July-2105,Dec2016

1. What is the role in RTOS? Use task states for your answer? Dec 2014
2. What is the Gray area of re-entrant? Give suitable example? Dec-2015
3. Compare Message queue, mail box and pipe Dec2016
4. Define the words race condition and interrupt Latency. Dec2016
5. Why pipes are called as Byte oriented task communication technique? Give one example? Nov-2013
6. What is Re-entrant function? What is the rules of Re-entrant function? July-2015, Dec-2014, June2016

Part-B(University Questions)

1. Explain various real-time scheduling considerations for saving memory with example.Nov-2013
2. What is shared data problem? Explain the solution for it with example?Nov-2013
3. Consider task A and B is an interrupt sequence routine (ISR) sharing the variable X, Explain the problems related to sharing the data and its solution?July-2014
4. Explain RTOS design principles July-2014
5. What hardware and software factors might be considered when choosing a computing platform? July-2014
6. What is shared data problem? How can the semaphores are used to solve it? Explain with example. Dec-2014
7. Explain Hard real-time scheduling considerations with example. Explain various methods for saving power in RTOS.Dec-2014,July-2015,June-2016
8. What are the problems arising due to shared data and how can a semaphore be used to solve this problem explain with example. July-2015
9. Discuss the rules to be followed by Interrupt routines in RTOS environment with example.July-2015,Dec-2015,June-2016, Nov-2013
10. Explain the advantages and disadvantages of having more number of task in the system.Dec-2015
11. Explain about the underground tank monitoring system.June-2016
12. Explain message queues, mailboxes and pipes.June-2016
13. Write short notes on Timer functions.June-2016
14. Describe platform level performance analysis for advanced processors.June-2016