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Question Paper Code : X10375

B.E./B.Tech. DEGREE EXAMINATIONS – NOV / DEC 2020 AND APRIL / MAY 2021

Seventh/ Eighth Semester

Electronics and Communication Engineering

EC8791 - EMBEDDED AND REAL TIME SYSTEMS

(Common to: Medical Electronics/ Biomedical Engineering)

(Regulations 2017)

Time: 3 Hours

Answer ALL Questions

Max. Marks: 100

PART- A (10 x 2 = 20 Marks)

1. Mention the need of microprocessor in embedded system.
2. Summarize the challenges in embedded computing system design.
3. List the three different profiles of ARM cortex Processor.
4. Distinguish between single and double edged PWM.
5. Differentiate compiler and cross compiler.
6. Mention the different components for embedded programs.
7. Define Performance measures for real time systems.
8. Outline the definition for a schedule as a function.
9. List the advantages and limitations of Priority based process scheduling.
10. What is priority inheritance and priority inversion?

PART- B (5 x 13 = 65 Marks)

11. a) Design a model train controller with suitable diagram and explain. (13)

OR

- b) Demonstrate the goal of design methodology in detail. (13)
12. a) Classify the ARM instruction set and explain any one type of instruction set with example. (13)

OR

- b) Discuss about the types of stacks and subroutines supported by ARM processor. (13)
13. a) With the help of a flow chart describe the basic compilation process. (13)

OR

- b) Outline the Program level energy and power analysis and optimization. (13)
14. a) Criticize on reliability models for hardware redundancy. (13)

OR

- b) Discuss in detail about the structure of a real time system. (13)
15. a) Explain the concepts of Multiprocessor System-On-Chip (MPSoC) and Shared memory multiprocessors used in embedded applications. (13)

OR

- b) Illustrate in detail about
- i) Characteristics of distributed embedded System. (6)
- ii) Architecture of Distributed Embedded System with neat sketches. (7)

PART- C (1 x 15 = 15 Marks)

16. a) Write a program to find the sum of $4X + 9Y + 4Z$, where $X = 2$, $Y = 3$ and $Z = 4$ using ARM Processor instruction set. (15)

OR

- b) Illustrate video accelerator using UML methodology, from design flow analysis to architectural design. (15)



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Question Paper Code : 91463

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Seventh/Eighth Semester

Electronics and Communication Engineering

EC 6703 – EMBEDDED AND REAL TIME SYSTEMS

(Common to Biomedical Engineering/Computer Science and Engineering/

Medical Electronics)

(Regulations 2013)

(Also Common to PTEC 6703 – Embedded and Real Time Systems/B.E. Part-Time
Sixth Semester/Seventh Semester – Electronics and Communication Engineering/
Computer Science and Engineering – Regulations 2014)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. How traps are handled in ARM Processor ?
2. What are the factors to be considered while designing an Embedded System Process ?
3. What is the concept of Busy Wait I/O ?
4. What are the basic types of memory components that are commonly used in embedded systems ?
5. How to compute the CPU utilization of the system ?
6. Bring out the difference between multiple process and multiple task.
7. What is the significance of CRC card ?
8. What is the difference between single hop and multi hop network ?
9. What are the inputs on which the engine controller will be working upon to generate a proper control signal ?
10. What is the need for a software modem ?

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PART – B

(5×13=65 Marks)

11. a) Explain how characters are copied from input to output using interrupts and buffers with the help of a program segment. (13)
(OR)
- b) i) Analyze the data operations of an ARM processor. (4)
ii) With neat sketches, explain the ARM address translation mechanism. (9)
12. a) i) Enumerate the factors that causes delay in peripheral interface. (4)
ii) Explain with neat diagrams on how DMA based processor can mitigate delay in high speed processors. (9)
(OR)
- b) i) Discuss the role of assemblers and linkers in the compilation process. (9)
ii) Elucidate the significance of program validation and testing. (4)
13. a) i) Explain the context switch mechanism for moving the CPU from one executing process to another with an example. (9)
ii) Explain how the Kernel determines the order of the processes to be executed. (4)
(OR)
- b) i) Give an account on : POSIX. (4)
ii) Discuss briefly about the various power optimization strategies in embedded system with relevant examples. (9)
14. a) Discuss the concepts of MPSoC and shared memory multiprocessor in embedded applications. (13)
(OR)
- b) i) Explain the features of SDL specification language with suitable diagrams. (6)
ii) Draw the architecture of Distributed Embedded System and explain its characteristics. (7)
15. a) With neat diagrams, briefly explain the role of video accelerator used in a digital video camera. (13)
(OR)
- b) Using UML diagrams, explain the design process and characteristics of the data compressor. Analyze its design flow, requirements and specifications with architectural design. (13)

PART – C

(1×15=15 Marks)

16. a) i) Briefly explain the various techniques used in clearbox testing. (9)
ii) Explain the need for Incircuit Emulators (ICE), JTAG for embedded system development. (6)
(OR)
- b) With neat diagrams, briefly explain the design of a telephone answering machine with sophisticated inbuilt features. Discuss the design and characteristics of the system with the help of UML diagrams. (15)

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Question Paper Code : 52928

B.E. Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh/Eighth Semester

Electronics and Communication Engineering

EC 6703 – EMBEDDED AND REAL TIME SYSTEMS

Common to: B.E. Biomedical Engineering/Computer Science and Engineering/
Medical Electronics.

(Regulation 2013)

(Also Common to: PTEC 6703 – Embedded and Real Time Systems–Sixth
Semester – Electronics and communication Engineering – Seventh Semester –
Computer Science and Engineering (Regulation 2014))

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Compare the functions of CPU and Co-processor.
2. Define assembler.
3. What is meant by linking and loading?
4. Define embedded programming?
5. What is priority inheritance and priority inversion?
6. How does priority scheduling improve multitask execution?
7. Mention a power saving strategy adopted for real time systems.
8. Why is Benchmark Comparison done for new design?
9. List out the major components of audio player.
10. What is the need for video accelerator?

PART B — (5 × 13 = 65 marks)

11. (a) Demonstrate the challenges and performance of embedded processes for real time system design. (13)

Or

- (b) Analyze the preference of ARM processor Instruction set over CISC processes. (13)

12. (a) Illustrate how of embedded system design is done using IDE (Integrated Development Environment). (13)

Or

- (b) Compare various program validation and testing methods done for system design. (13)

13. (a) Discuss why preemptive scheduling is preferred in real time operating systems. (13)

Or

- (b) Demonstrate about inter process communication mechanisms. (13)

14. (a) Analyze system design technique by giving specifications for a case study like a digital camera. (13)

Or

- (b) Illustrate why MPSoCs are preferred over general purpose microprocessor. (13)

15. (a) Outline the design example telephone answering machine. (13)

Or

- (b) Outline the design example of embedded control of Engine Control Unit. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Evaluate the system design technique for large data analysis using video accelerator. (15)

Or

- (b) Design an alarm clock using embedded systems design techniques. (15)

PART B — (5 × 13 = 65 marks)

11. (a) Draw and explain ARM architecture in detail.
- Or
- (b) (i) Design a Model Train Controller with suitable diagrams, and explain. (7)
- (ii) Give an account on CPU power consumption. (6)
12. (a) (i) Discuss the basic types of memory components, that are commonly used in embedded systems. (7)
- (ii) Compare and contrast the debugging techniques used in embedded system. (6)
- Or
- (b) Explain energy, power and program size optimization in detail.
13. (a) (i) Compare RMS versus EDF. (7)
- (ii) Explain about Windows CE with a neat diagram. (6)
- Or
- (b) Explain inter process communication mechanisms and evaluating operating system performance in detail.
14. (a) (i) With a neat diagram, describe the typical bus transactions on the I²C Protocol.
- (ii) Discuss the role of distributed embedded architecture available for embedded systems.
- Or
- (b) Explain the various design methodologies and design flows in system design.
15. (a) (i) Illustrate the working of engine control unit with a diagram. (7)
- (ii) Illustrate the working of Video player. (6)
- Or
- (b) Write technical notes on “Applications of Embedded systems in software modem and digital still camera”.

PART C — (1 × 15 = 15 marks)

16. (a) Design data compressor using UML methodology. Analyse its design flow, requirements, specifications with architectural design.
- Or
- (b) From design flow analysis to architectural design, illustrate video accelerator using UML methodology.



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Question Paper Code : 40973

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh/Eighth Semester

Electronics and Communication Engineering
EC 6703 – EMBEDDED AND REAL TIME SYSTEMS
(Common to Biomedical Engineering/Computer Science and Engineering/
Electronics and Communication Engineering/Medical Electronics)
(Regulations 2013)

Maximum : 100 Marks

Time : Three Hours

Answer ALL questions

(10×2=20 Marks)

PART – A

1. What are the basic sources of CMOS power consumption?
2. List the functions of ARM processor in supervisory mode.
3. Differentiate Harvard and Von Neumann architecture.
4. What is the basic building block of most bus protocol?
5. Define context switching in RTOS.
6. Illustrate the interconnect networks developed for distributed embedded systems.
7. What do you mean by accelerators in embedded multiprocessor?
8. Mention the goals of design process in embedded computing systems.
9. Determine the requirements of block motion estimator.
10. What are data compressors?

PART – B

(5×16=80 Marks)

11. a) Explain model train controller with the frame format of DCC.

(OR)

- b) Describe the different factors involved in embedded system design process.



12. a) i) Describe about the basic types of memory components that are commonly used in embedded systems. (8)
ii) Explain models of the program with no conditionals. (8)
(OR)
b) Outline the role of assemblers and linkers in the compilation process.
13. a) i) Elucidate on scheduling policies with suitable examples. (8)
ii) Summarize the services of operating system in handling multiple tasks and multiple processes. (8)
(OR)
b) With neat sketch, explain the interprocess communication mechanism.
14. a) Observe in detail about Quality Assurance Process using the following :
i) Quality Assurance Techniques. (8)
ii) Verifying the specifications. (8)
(OR)
b) Discuss about the distributed embedded architecture.
15. a) i) Demonstrate in detail about design example of audio player. (8)
ii) Summarize the principle and operation of software MODEM. (8)
(OR)
b) Demonstrate the sequence diagram of taking picture with digital still camera.



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Question Paper Code : 50455

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Seventh/Eighth Semester

Electronics and Communication Engineering

EC6703 – EMBEDDED AND REAL TIME SYSTEMS

Common to : Biomedical Engineering/Computer Science and Engineering Medical

Electronics

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What is the role of Microprocessor in embedded computing ?
2. How traps are handled in ARM processor ?
3. List the memory devices used in the design of embedded system.
4. How power can be optimized at the program level ?
5. List the advantages and limitations of Priority based process scheduling.
6. State the major functions of POSIX RTOS.
7. Give the design flow used in embedded system design.
8. Draw the block diagram of Distributed embedded system.
9. What are the major components used in the design of Alarm clock ?
10. Write the main functions performed by Video accelerator.

PART – B

(5×16=80 Marks)

11. a) Explain in detail the embedded system design process with an illustrative example of Model Train controller.

(16)

(OR)



- b) i) Explain the function of ARM processor instructions. (8)
ii) Discuss on the operation of Coprocessor used with ARM processor. (8)
12. a) i) Explain the various components and programming models used for developing embedded programs. (8)
ii) With an example in consumer electronics, explain the embedded system design with computing platform. (8)
(OR)
- b) i) Explain the principle of various compilation techniques. (8)
ii) Discuss about the embedded system software performance analysis and optimization. (8)
13. a) i) Explain how multiple processes are handled by Preemptive real time operating system. (6)
ii) Discuss about the features and services of Windows CE real time operating system. (10)
(OR)
- b) i) Write short note on the power optimization strategies for processes in real time operating system environment. (6)
ii) Compare the principle, merits and limitations of Inter-process communication mechanisms. (10)
14. a) i) Discuss about the embedded system design methods and explain the importance of Requirement Analysis. (8)
ii) Explain the principle of Quality Assurance techniques used in embedded system design. (8)
(OR)
- b) Explain how the concepts of Multiprocessor System-On-Chip (MPSoC) and shared memory multiprocessors are used in embedded applications. (16)
15. a) Explain operation of the following : (5+6+5)
i) Audio Player
ii) Digital still camera
iii) Software modem.
(OR)
- b) Justify that Engine Control Unit is an embedded system. Explain in detail the hardware and software components of Engine Control Unit. (16)