**20ECJ11**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **February,2023** | **Electronics & Communication Engineering** | | |
| **Fifth Semester** | **Embedded System & Design** | | |
| **Time:** Three Hours | | **Maximum: 7**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X14=56 Marks) |

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| 1. | a) | Classification of embedded system. | CO1 | L2 | 1M |
|  | b) | What is firmware? | CO1 | L1 | 1M |
|  | c) | Differentiate soft real-time OS and hard real-time OS | CO1 | L1 | 1M |
|  | d) | Why DSP processors are more advantageous than microcontrollers? | CO2 | L2 | 1M |
|  | e) | Define Task and Task State | CO2 | L3 | 1M |
|  | f) | What is deadlock and mention its types? | CO2 | L2 | 1M |
|  | g) | What is the use of Message Queues, Mailboxes, and Pipes? | CO3 | L2 | 1M |
|  | h) | Differentiate Van-Neumann and Hardvard Architecture. | CO3 | L2 | 1M |
|  | i) | What is Pipeline? Explain its function in an ARM processor. | CO3 | L1 | 1M |
|  | j) | What is the purpose of FIQ/IRQ interrupts in ARM processors? | CO3 | L2 | 1M |
|  | k) | What is the purpose of control flow instructions in ARM Processors? | CO4 | L3 | 1M |
|  | l) | What is the purpose of Load and Store instructions in an ARM Processor? | CO4 | L2 | 1M |
|  | m) | Write assembly language program of addition of 2 numbers using ARM. | CO4 | L2 | 1M |
|  | n) | List the applications of ARM Processor. | CO4 | L3 | 1M |
| **Unit -I** | | | | | |
| 2. | a) | Explain in detail the Hardware architecture of the embedded system with a neat diagram. | CO1 | L1 | 7M |
|  | b) | What are the different categories of an embedded system? Give examples of each category. | CO1 | L3 | 7M |
|  |  | **(OR)** |  |  |  |
| 3. | a) | With a neat sketch, explain the software architecture of the embedded system. | CO1 | L2 | 7M |
|  | b) | Explain the following i) SPI ii*)* C Bus | CO1 | L1 | 7M |
|  |  | **Unit -II** |  |  |  |
| 4. | a) | Explain the following scheduling algorithm a) Shortest Job First. b) Round-Robin without Priority. c) Round-Robin with Priority. d) Preemptive Multitasking. e) Non-Preemptive Multitasking. | CO2 | L3 | 14M |
|  |  | **(OR)** |  |  |  |
| 5. | a) | What is a semaphore? Explain briefly about the types of semaphores with suitable examples. | CO2 | L1 | 7M |
|  | b) | What is the Priority Inversion Problem? How Priority Inheritance provides a solution to the Priority Inversion Problem, Explain. | CO2 | L3 | 7M |
|  |  | **Unit -III** | |  |  |
| 6. | a) | With the help of a neat diagram, explain the ARM core dataflow model. | CO3 | L4 | 7M |
|  | b) | Explain in detail the ARM 7 Processor Modes. | CO3 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 7. | a) | Explain briefly about the register set of the ARM7 Processor. | CO3 | L1 | 7M |
|  | b) | Describe the pipeline executing characteristics in an ARM processor with necessary diagrams and examples. | CO3 | L2 | 7M |
|  |  | **Unit -IV** |  |  |  |
| 8. | | Explain the following Thumb instructions with an example  i) Stack ii) Software interrupt iii) Single register load-store iv) Multiple register load-store | CO4 | L1 | 14M |
|  |  | **(OR)** |  |  |  |
| 9. | a) | Design an Automatic Washing Machine by using an ARM 7 processor | CO4 | L2 | 7M |
|  | b) | With an example each, explain the Thumb data processing instructions | CO4 | L3 | 7M |

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