KUMARAGURU
college of technology
character is life

Register Number:……..…

M.E DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

First Semester

EMBEDDED SYSTEM TECHNOLOGIES

P18EST1003: Software for Embedded Systems

COURSE OUTCOMES

CO1: Acquire the Knowledge and understanding of fundamental embedded systems.

CO2: Ability to use C to develop embedded software.

CO3: Able to familiarize embedded system software and hardware development tools.

CO4: Design paradigms, architectures, possibilities, and challenges, both with respect to software and hardware.

CO5: Acquire the knowledge of PYTHON Programming.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Sequence the phases of Software Design Life Cycle CO1 [K_2]

   1. Specification
   2. System design
   3. Implementation
   4. Requirement
   5. Testing and maintenance

   a) 1-4-2-3-5 b) 4-2-1-3-5

   c) 4-1-2-3-5 d) 1-2-4-3-5

2. The term ‘pipelining’ refers to CO2 [K_2]

   a) Address decoding b) Fetching next instruction while executing the current instruction

   c) Virtual memory addressing d) Memory writes

3. Sequence the operations involved in DMA process. CO1 [K_2]

   1. Terminal count register is decreased by one, with each byte of data transfer until the count value reaches zero.

2. Microprocessor suspends the operation, releases the buses and generates HLDA signal

3. DMA Controller sends HOLD signal

4. DMA Controller acquires the bus system and transfers the data

a) 3-4-1-2 b) 3-1-2-4

c) 3-4-2-1 d) 3-2-4-1

4. Match List I and List II CO2 [K_2]

List I	List II
A. # include	i. User header file
B. #include"file.h"	ii. no valid memory location
C. Embedded C	iii. Pre-processor directive
D. Null pointer	iv. Cross-development process

a) A-iii, B-i, C-iv, D-ii b) A-ii, B-i, C-iv, D-iii

c) A-iii, B-ii, C-iv, D-i d) A-ii, B-i, C-iii, D-iv

5. Which of the following is a part of RTOS kernel? CO3 [K_2]

1. Register
2. Interrupt Service Routine (ISR)
3. Scheduler
4. Device driver

a) 1,2,3 b) 1,3,4

c) 2,3,4 d) 1,2,4

6. Energy optimization in embedded systems can be performed by CO3 [K_2]

a) Emulator b) Debugger

c) Simulator d) Compiler

7. **Assertion (A):** Python Supports object oriented, structured, and functional programming. CO5 [K_3]

Reason (R): Python is an interpreted language.

a) Both A and R are True, and R is the explanation of A b) Both A and R are True, and R is not the explanation of A

c) A is True and R is False d) A is False and R is True

8. How is memory accessed in RISC architecture? CO4 [K_2]

a) Memory instructions b) Load and store instructions

c) Port programming

d) Opcode memory instructions

9. Which is not true about a bus? CO1 [K_2]

1. Interconnecting components that establish communication
2. Parallel conductors.
3. Harvard bus architecture has the same storage unit for data and instruction.

a) 1,2

b) 1,3

c) Only 2

d) Only 3

10. What will be the output a after execution of the following code when x=1? CO5 [K_2]

```
a = 10;
while (X < 1)
{
a = a – 1;
}
```

a) 9

b) 8

c) 10

d) 1

PART B (10 x 2 = 20 Marks)

11. How are interrupts handled in embedded system? CO1 [K_2]
12. List the factors to be considered while selecting microprocessor architectures for system design. CO2 [K_2]
13. Differentiate between C and Assembly language programming. CO2 [K_2]
14. Outline the significance of qualifiers in Embedded C coding. CO2 [K_2]
15. Write an embedded C code for transmitting a data byte from Port 2 to Port 1. CO3 [K_2]
16. What do you mean by compile time errors? CO3 [K_2]
17. What is Instruction Set Simulator (ISS)? CO4 [K_2]
18. How to set time delay in embedded C? CO4 [K_3]
19. List the features of Python environment. CO5 [K_2]
20. How to create classes and objects in Python ? CO5 [K_2]

PART C (6 x 5 = 30 Marks)

21. Compare and contrast RISC and CISC architectures. CO1 [K_2]

22. What is a void pointer in Embedded C? Explain with a suitable program. CO2 [K_2]

23.	What is the need for a timeout mechanism? How to create hardware timeouts?	CO3	[K_2]
24.	Elucidate decision and control statements in Embedded C with appropriate code snippet.	CO2	[K_2]
25.	What is hardware debugging? Explain the hardware debugging tools available for embedded systems.	CO4	[K_2]
26.	How are errors and exceptions handled in a python environment? Explain	CO5	[K_2]

Answer any FOUR Questions
PART D (4 x 10 = 40 Marks)

27.	Explain Direct Memory Access (DMA) with a block diagram.	CO1	[K_2]
28.	How to invoke a function defined in another embedded C file? Explain local and global variables with an example.	CO2	[K_2]
29.	What is the difference between native and cross-platform development? Explain the tools supporting the firmware development.	CO4	[K_2]
30.	Explain Macro and In – line assembly programming with necessary embedded C code?	CO3	[K_2]
31.	How to define dictionaries and lists in Python? Compare the conditional loops of python with C programming.	CO5	[K_2]

****