Reg. No. | | | | | | | | | |

Question Paper Code : 20159

B.E. / B.TECH. DEGREE EXAMINATIONS, NOVEMBER / DECEMBER 2023

Seventh Semester

B.Tech. – Information Technology

19IT701 – EMBEDDED SYSTEMS PROGRAMMING

(Regulations: Mepco – R2019)

Duration: 3 Hours Max. : 100 Marks

Answer ALL Questions

BTL, CO

PART A – (10 × 2 = 20 Marks)

R, CO1 1. Consider the following the assembly language instructions:

MOVLW 0x41

MOVWF TXREG

MOVFF PORTB, TXREG

How many bits are transferred serially via the TX pin? Justify your answer.

A) 8 B) 10 C) 2 D) 11

U, CO1 2. Highlight the differences between C and embedded C.

A, CO2 3. _____ minimum number of port lines are required to interface 32 switches in a matrix format. Justify your answer.

A, CO2 4. What is the resolution of 10 bit ADC? Assume V_{ref} as 5 V.

R, CO3 5. The CPU allocation for a process may change when it changes its state from_____. Justify your answer.

U, CO3 6. Compare General Purpose Operating System (GPOS) and Real Time Operating System (RTOS).

R, CO4 7. Identify the tool from the following that places the code and data at fixed memory locations. Justify your answer.

A) Linker B) IDE C) Locator D) Memory card reader

U, CO4 8. Outline the various debugging tools required at the time of development of embedded system.

R, CO5 9. Summarize the features of Arduino development board.

U, CO5 10. _____ is not a sensor. Justify your answer.

A) Screw jack B) DC motor C) Barometer D) Speaker

PART B – (5 × 16 = 80 Marks)

A, CO1	11. a) i.	Assume that a push button is connected to INT0 and a LED is connected to RB7. Write an assembly language for the following A) When push button is pressed, LED should glow and a byte 55 should be sent on PORT C. B) When push button is not pressed, LED should turn off.	(8 Marks)
A, CO1	11. a) ii.	Write in detail about timer programming in PIC.	(8 Marks)
		OR	
A, CO1	11. b) i.	Write an assembly language program to read a byte from PORT A at an interval of 5 sec. If the byte is greater than 7Fh, send FFh on PORT B else send 00h on PORT B.	(8 Marks)
U,CO1	11. b) ii.	With examples, explain the data types in embedded C.	(8 Marks)
A, CO2	12. a) i.	Interface a 16 x 2 LCD module with PIC microcontroller. Write an application program to display the character “WELCOME” in the Line-I and Date as 01.01.2023 in the Line-II of the display unit.	(12 Marks)
U, CO2	12. a) ii.	Discuss the necessity of relay in an embedded systems development.	(4 Marks)
		OR	
A, CO2	12. b) i.	Create an embedded system that measures the temperature and displays it in LCD module using PIC microcontroller. Discuss the functionality of the system in detail.	(12 Marks)
U, CO2	12. b) ii.	Write the applications of PWM.	(4 Marks)
U, CO3	13. a) i.	With an example, explain how semaphores resolve the shared data problem.	(8 Marks)
U, CO3	13. a) ii.	Discuss the various function calls supported by RTOS for memory management in an embedded system.	(8 Marks)
		OR	
U, CO3	13. b) i.	Suggest suitable techniques to improve the scheduling of tasks/process for hard real time systems.	(8 Marks)
U, CO3	13. b) ii.	Summarize how the RTOS establishes the communications among the process/task.	(8 Marks)

U, CO4	14. a) i.	Point out the various hardware testing tools available in a laboratory. Discuss their functionalities in detail.	(8 Marks)
U, CO4	14. a) ii.	What is an Instruction Set Simulator (ISS)? Explain the various debugging parameters obtained from ISS.	(8 Marks)

OR

U, CO4	14. b) i.	Enumerate the sequence of steps involved in getting the embedded software onto the target system.	(8 Marks)
U, CO4	14. b) ii.	Discuss how the target system is debugged on the host system.	(8 Marks)
A, CO5	15. a)	Develop an embedded system with the following hardware components: A) Soil moisture sensor B) Arduino development board C) LCD module Above system should measure the soil moisture and display in the LCD module. With a suitable interface diagram, explain the functionality of the system. Write application software for the above system. Assume necessary details.	(16 Marks)

OR

A, CO5	15. b)	Create a smart parking system for a shopping mall. System uses proximity sensors, buzzers, Arduino development board and LEDs for indications. Develop the block diagram and application software for the system and explain. Assume necessary details.	(16 Marks)

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