Reg. No.																

Question Paper Code	14078

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Sixth Semester

Electronics and Communication Engineering

20ECEL604 - SOFTWARE FOR EMBEDDED SYSTEMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which preprocessor directive is used to define a symbolic constant? (a) #include (b) #ifdef (c) #define (d) #pragma	1	K1	CO1
2.	Which command is typically used to generate the configure script? (a) make (b) autoconf (c) gcc (d) ld	1	K1	CO1
3.	Which operator is used to access the address of a variable in C? (a) * (b) & (c) % (d) ->	1	K1	CO2
4.	In C, which statement is used for an infinite loop? (a) for (b) while (c) else (d) if	1	K1	CO2
5.	What is a major consideration when designing an embedded OS for real-time alarm systems? (a) Ensuring immediate response to critical events (b) Using complex GUI (c) Increasing system clock speed unnecessarily (d) Eliminating task scheduling for better performance	1	K1	CO3
6.	What is a key advantage of using alternative system architectures in embedded systems? (a) Reduced software complexity (b) Increased power consumption (c) Dependence on proprietary hardware (d) Incompatibility with real-time applications	1	K1	CO3
7.	Which of the following is typically used for creating loop timeouts in embedded systems? (a) software timers or counters (b) hardware interrupts (c) loop delay using for or while loops (d) both a and c	1	K1	CO4
8.	Which component of an embedded OS handles inter-task communication? (a) Scheduler (b) Memory manager (c) IPC mechanisms (d) Bootloader	1	K1	CO4
9.	Which of the following is a valid Python data type? (a) string (b) str (c) txt (d) char	1	K1	CO5
10.	Which of the following is NOT a real-time constraint in Embedded C programming? (a) memory usage (b) power consumption (c) delays for hardware interfacing (d) file i/o operations	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Illustrate the dependency in a Makefile with an example.	2	K2	CO1
12.	Contrast flat profile with call graph in gprof output.	2	K2	CO1
13.	Explain how you would read an integer from the user in C using scanf() and check if the input was successful.	2	K2	CO2
14.	Describe the difference between a while loop and a do-while loop in C/C++.	2	K2	CO2
15.	Summarize the main types of timers used for creating hardware delays.	2	K2	CO3
16.	Relate how does clock frequency affect hardware delay generation.	2	K2	CO3
17.	Discuss the major portability issues in an embedded OS.	2	K2	CO4
18.	Summarize the steps to be followed by the developers to improve the portability of an embedded OS.	2	K2	CO4
19.	Explain how to open and write data to a file in C++.	2	K2	CO5

20.	Demonstrate how to catch an exception using a try-catch block in C++.		*2*	*K2*	*CO5*
21.	How can software delays affect real-time embedded systems?		*2*	*K1*	*CO6*
22.	Why are timeout mechanisms crucial in industrial real-time applications like PLC (Programmable Logic Controllers)?		*2*	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain the compilation process involved in c pre-processor.Describe the key features of GDB (GNU Debugger). Demonstrate how to perform the following tasks using GDB commands.	*11*	*K2*	*CO1*
		OR			
	b)	Demonstrate the use of macros and conditional compilation using the C preprocessor.	*11*	*K2*	*CO1*
24.	a)	Describe the programming process and control statements available in C.	*11*	*K2*	*CO2*
		OR			
	b)	Describe the stages of the C programming process. Then, write a C program using for, while, and do-while loops to calculate the factorial of a number. Discuss which loop is the most appropriate for this scenario.	*11*	*K2*	*CO2*
25.	a)	Develop an Embedded C program that creates a precise hardware delay using timers instead of software loops.	*11*	*K3*	*CO3*
		OR			
	b)	Develop a structured C program using modular programming principles for an embedded system that controls LED blinking with different delays.	*11*	*K3*	*CO3*
26.	a)	Design and implement a hardware timeout mechanism using a watchdog timer for an embedded system.	*11*	*K3*	*CO4*
		OR			
	b)	Develop an Embedded C program for an industrial conveyor belt system that uses real-time constraints to ensure smooth operation.	*11*	*K3*	*CO4*
27.	a)	Create a program that reads a file, counts the number of words in the file, and prints the word count. Handle errors if the file cannot be opened.	*11*	*K3*	*CO5*
		OR			
	b)	Implement a C++ program that reads a list of integers from the user until the user enters -1, and then prints the sum of all entered integers.	*11*	*K3*	*CO5*
28.	a)	Utilize the concept of using structs in Embedded C for managing hardware peripherals like sensors and actuators. Provide an example of using structures for handling different sensor types in a system.	*11*	*K3*	*CO6*
		OR			
	b)	Identify how structures can be used to improve code organization and maintainability in Embedded C. Provide an example of a structure used to handle sensor data.	*11*	*K3*	*CO6*