Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 12-12-2025 **Time:** 01:00pm– 04:00pm

School: SOE	**Program:** B. Tech	
Course Code : ECE3175	**Course Name:** Embedded Systems	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	09	16	14	12	22	27

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

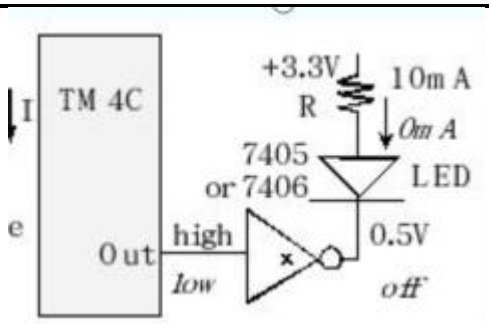
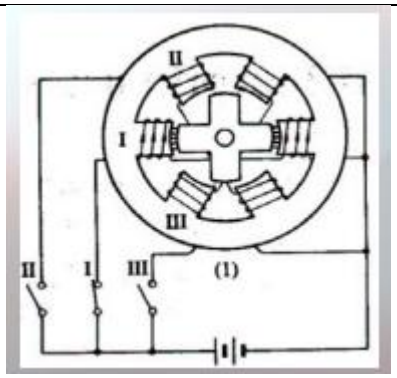
Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Write the assembly level instruction to perform addition and subtraction operation	**2 Marks**	**L4**	**CO2**
2.	Differentiate static and dynamic RAM	**2 Marks**	**L2**	**CO1**
3.	What is the difference between while and do while loop ?	**2 Marks**	**L3**	**CO3**
4.	What is the need of a NVIC in a ARM processor	**2 Marks**	**L4**	**CO2**
5.	Write a simple circuit to interface a switch to the TM processor using positive logic	**2 Marks**	**L3**	**CO4**
6.	Differentiate between Round Robin scheduling and polling operation	**2 Marks**	**L4**	**CO5**
7.	Write a basic C function to generate a delay using for loops	**2 Marks**	**L3**	**CO3**
8.	What is meant by Board Support Packages	**2 Marks**	**L4**	**CO6**
9.	What are the PSR registers in ARM cortex 4 used for?	**2 Marks**	**L2**	**CO1**
10.	Endianness is a term that describes the order in which a sequence of bytes is stored in computer memory. Represent the following data in Little Endian and Big Endian Data 1: FF208779h, Data 2: 1209AA2h.	**2 Marks**	**L2**	**CO2**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	 For the Circuit shown what is the value of R. Let the diode voltage be 0.7V, the output voltage of the driver is 0.9V.	**5 Marks**	**L4**	**CO6**
	b.	An embedded system is a hardware or software integrated device that performs a specific function. What the features of embedded systems which makes it popular	**5 Marks**	**L2**	**CO1**
		Or			
12.	**a.**	 For the stepper Motor shown below, find the step angle ? and Total number of steps N.	**5 Marks**	**L4**	**CO6**
	b.	Memory in an embedded system is a physical storage, where an embedded device uses the memory to store the data that the processor receives and manipulates it or to store long-term information about the instructions that the CPU executes. Briefly describe the Memory Systems used in Embedded Systems.	**5 Marks**	**L2**	**CO1**

13.	**a.**	Monthly income of four people in a family is $3000h, $3500h, $4000h & $5000h. Write an ALP using ARM instructions to find the average income of the family	**10 Marks**	**L4**	**CO2**
		Or			
14.	**a.**	In ARM Processor, Addressing modes is the way for which an operand is specified for an instruction in the general purpose register or in memory location. Interpret the different addressing modes available in the ARM Processor and output for each of the following cases.	**10 Marks**	**L4**	**CO2**

		Given R1= 25397691h, R2= 6354E1F5h, and R3= 63A65DBCh. (i) LDR R8, [R1, R3 LSL#3] (ii) STR R3, [R1, R2 LSR#4] (iii) STR R2, [R3], R1 (iv) LDR R6, [R1], -R3, LSL#4			

15.	**a.**	C Programming is used in Embedded System to develop Embedded software(Firmware). Write a C program to print numbers from 0 to 5 using (i) if-else statement (ii) Switch statement. Indicate the importance of each statement. (Hint: if "0" is entered it should print "Zero")	**10 Marks**	**L3**	**CO3**
		Or			
16.	**a.**	A group of pins present on the processor is called a port. There exists a circuitry between the pin and its port's registers to communicate between the processor and the external devices connected to it. It can be configured as inputs or outputs. Interpret the I/O port operation performed in Processor of the embedded system with suitable diagrams.	**10 Marks**	**L3**	**CO3**

17.	**a.**	The CAN (Controller Area Network) protocol is a set of rules for transmitting and receiving messages in a network of electronic devices. It defines how data is transferred from one device to another in a network and was developed with a specific focus on the auto industry. With block diagram, discuss the operations performed in CAN Bus protocol.	**10 Marks**	**L3**	**CO4**
		Or			
18.	**a.**	I2C is a serial communication protocol that only requires two signal lines. It was designed for communication between chips on a printed circuit board (PCB). The I2C protocol includes arbitration and collision detection capabilities which allow smooth communication along the bus which make a good choice for many embedded design applications. With suitable diagram illustrate the I2C Bus Protocol used in designing embedded systems.	**10 Marks**	**L3**	**CO4**

19.	**a.**	An RTOS (Real-Time Operating System) is a type of operating system that is designed to meet the requirements of real-time applications, which require quick and predictable responses to events. RTOS are of 3 types Hard RTOS, Soft RTOS and Firm RTOS. Define Hard RTOS and Soft RTOS	**20 Marks**	**L2**	**CO5**
		Or			
20.	**a.**	Write a short note on i.Memory Management ii. Semaphones in RTOS	**20 Marks**	**L2**	**CO**5

21.	**a.**	With a neat flow chart explain the steps by steps in selecting a microcontroller	**10 Marks**	**L4**	**CO6**

	b.	There are over 100 RTOS available in the commercial market. Selection of these RTOS for a given Embedded system is very difficult due to the issues in compatibility with the hardware platform and architecture of the target system. Discuss the salient features for the following RTOS-MicroC/OS-II,	**10 Marks**	**L4**	**CO6**
		Or			
22.	**a.**	RTOSes are commonly used in embedded systems such as medical devices and automotive ECUs that need to react to external events within strict time constraint. Explain the concept of tasks in a Real-Time Operating System (RTOS).	**10 Marks**	**L4**	**CO6**
	b.	A kernel is the core part of an operating system. It acts as a bridge between software applications and the hardware of a computer. Categorize different types of kernels	**10 Marks**	**L4**	**CO6**