

Programme Name & Branch : B.Tech. (IT)
 Course Code and Course Name : BITE403L - Embedded Systems & IoT
 Faculty Name(s) : Dr. Swarna Priya RM, Dr. Nithya S, Dr. Pounambal M
 Class Number(s) : VL2025260502202, VL2025260502206, VL2025260502197
 Date of Examination : 31/1/2026
 Exam Duration : 90 minutes
 Maximum Marks: 50

General instruction(s):

Answer All Questions

- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes
CO1: Interpret embedded systems components for a real time product applying all the relevant standards with realistic constraints across all domains
CO2: Build a hardware platform encompassing microcontrollers, sensors and peripherals.

Q. No	Question	M	CO	BL
1. (a)	An 8051 is connected to an external ROM for program execution. When the microcontroller fetches an instruction from external ROM, state the logic level (HIGH/LOW) of the following pins and justify each: (4 Marks) - EA - PSEN - ALE - RD - WR	10	1	3
(b)	You are designing a conveyor belt control system using an 8051 microcontroller. A proximity sensor outputs a high pulse whenever an object passes a checkpoint. The sensor is connected to P1.2. Sample the sensor every 50 microseconds. The microcontroller is functioning with a crystal oscillator frequency of 24 Mhz. It has to work 24/7 hence there should be a mechanism for reloading automatically. Write the ALP program. Show the configurations of TMOD, TCON and Timer registers. (6 Marks)			
2. (a)	Identify the addressing mode of each instruction, compute the effective address wherever applicable, and determine the final value in the accumulator (5 Marks) Memory 20H: 05H 4DH: 12H 6DH: 05H 300H: 22H 350H: 48H 380H: 10H 3CDH: A5H Registers RI=350H DPTR=380H A=18H CY=1	10	1	3

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS

**CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2025-2026**

SLOT: E1+TE1

	Instructions MOV A,@R1 ADD A,20H MOVC A,@A+DPTR SUBB A,#30H Write an assembly language program to count the number of even and odd numbers among 12 numbers stored from 2400H onwards. Store the even count at 2200H and odd count at 2201H. (5 Marks)			
(b)	3. Design a Smart Intrusion Detection System using Arduino. If motion is detected and an object is present within 20 cm, activate a buzzer. Identify the sensors and actuators with specifications and interfacing pins. Draw the circuit diagram. Write the Arduino program.	10	2	4
	Different embedded system applications are listed below. Categorize them based on the functional requirements and the performance. A. A heart-monitoring device implanted in a patient continuously senses heart rhythm and immediately delivers electrical stimulation when abnormal patterns are detected. Any delay in response may cause serious health risks. B. Traffic signals at multiple road junctions collect vehicle density data using sensors and share this information with a central controller through a communication network. Signal timings are dynamically adjusted to reduce congestion. C. A battery-powered drone captures live video and responds to real-time control commands sent wirelessly from a smartphone application. The drone changes direction, altitude, and camera angle while in motion. D. A smoke detector installed in a house continuously monitors air quality. When smoke concentration exceeds a preset limit, it immediately activates an alarm without relying on internet connectivity. E. An automobile airbag system continuously monitors acceleration sensors and deploys airbags within milliseconds when a sudden collision is detected.	5	1	4
(ii)	For each of the following applications, identify the type of Real-Time Operating System (RTOS) required. A. An anti-lock braking system (ABS) continuously monitors wheel speed and applies braking force to prevent skidding. The braking response must occur within strict time limits to ensure vehicle safety. B. A live audio streaming application delivers music over the internet where small delays or occasional packet loss may reduce quality but do not cause system failure. C. A missile guidance system processes sensor data and adjusts the flight path in real time. Missing a timing deadline can result in mission failure. D. A multimedia gaming console renders graphics and audio in real time. Occasional frame drops are acceptable but prolonged delays degrade user experience. E. An automated trading algorithm executes buy and sell orders based on real-time market data. Late execution may cause monetary loss, but the system can recover and continue operation.	5		
5.	Design a Smart Parking Monitoring System using NodeMCU where distance measured by an ultrasonic sensor is sent to the Blynk application for real-time visualization.	10	2	4