Reg. No.:

Name :

VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test II – October 2024

Programme	:	**B.Tech (CSE)**	Semester	:	**FS 2024-25**
Course	:	**Embedded Systems**	Code	:	**BCSE305L**
			Class Nbr	:	**CH2024250100426**
Faculty	:	**NITISH KATAL**	Slot	:	**C2+TC2**
Time	:	**90 Minutes**	Max. Marks	:	**50**

Answer ALL the questions

Q.No.	Sub. Sec.	Questions	Marks	BT Level
1.	a)	Accounting company uses a compression technique to encode the message before transmitting over the network. Build appropriate dictionary based compression technique on the hexadecimal data. (i) BFBBBFFFFBFBFFFBBBFFFBFF (2). (ii) EECECCCCEEEECCCCEEEECECE (2). (iii) If each of the above hexadecimal value size is 1 byte, justify efficiency of the compression technique (1).	5	L2
	b)	Accounting company provided its customers with a mobile application that could reverse the compression process and show customers the complete data when requested. The input to the mobile application is in format as given below. Use appropriate dictionary based inverse compression technique on the below symbols **E,F,2C,3D,4C,3B, 4A, 5E**	5	L3
2.		The Generative AI with embedded project that you do was selected for presentation in a conference in Germany. Hotel accommodation in charge was assigned to yourself among five people attending the conference. For the purpose, you use one of the ecommerce sites to book the hotel. Once the hotel is booked, the ecommerce website would enable you to move to the following steps for room booking • Create a new profile with username and password, if existing use the user credentials to login to the e-commerce site. • Identify appropriate room and food requests such as breakfast, lunch and dinner. For suite, breakfast, lunch and dinner will be provided. • Amenities in the hotel such as gym, swimming pool etc that you tend to use during the course of stay should be selected, if yes it will be added to total bill. • Once you select the above options, select the mode of payment, you have following as option credit card, International debit card and, Cash on arrival. For the above scenario, identify and list out its essential requirement. Draw the appropriate UML diagram that emphasis on the time sequence of messages and structural organization between the various elements involved in the above scenario. Also make sure that the identified UML diagram has proper notations.	10	L3

3	a)	Consider an embedded system used in a smart thermostat to control the heating and cooling of a building. Describe the techniques of code optimization that can be applied in this system to improve response time, reduce power consumption, and minimize memory usage. Provide examples of how each optimization technique can enhance the performance of the thermostat's control algorithm.	5	L2
	b)	A digital traffic light control system is experiencing unexpected behavior, such as lights not switching at the correct time intervals. Explain the working principle of a logic analyzer and discuss how it can be used to debug this system. How can the logic analyzer help in identifying timing and synchronization issues that may be causing the traffic lights to malfunction?	5	L3
4		Analyse the embedded applications given below and identify the type of RTOS required for their implementation based on their functional requirement. Justify your answer. (i) Airline Traffic Control System (ii) Heart Pacemaker (iii) Infotainment system in automotive (iv) Telephone Switching System (v) Network Multimedia System	10	L2
5.		Table I presents an RMS schedule for a real-time military tracking system. The system consists of 3 tasks to be scheduled, each with their corresponding computation time and period. Table I: Task Scheduling Requirements **Task** | **Description** | **Computation Time (C)** | **Period (T)** | **Priority** UTL | Update Track Log | 10 | 20 | UTr | Object Tracking | 3 | 10 | GPST | GPS Triangulation | 1 | 5 | Use the above task schedulability requirements, perform necessary and sufficient tests and Rank the priority of the task as T1,T2 and T3 in the above column. State your findings and justify use of RMS for such real time military application.	10	L3