Programme	:	B.Tech (CSE)	Semester	:	WS 2024-25
Course Code & Course Title	:	BCSE305L EMBBEDDED SYSTEMS	Class Number	:	CH2024250501657 CH2024250501661 CH2024250501663 CH2024250501666 CH2024250501668 CH2024250501670
Faculty	:	VIJAYKUMAR P NITISH KATAL P. LATHA M. SINDHUJA KIRAN KUMAR M SUHASINI	Slot	:	E2 + TE2
Duration	:	90 Minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	Blooms Taxonomy Level
1		A telecommunication company wants to efficiently transmit messages without any loss in the information over the network. Develop an optimal encoding scheme using tree leaf node based on the given message: AAAABBBCCCDBCAADDBEECCBAAA. i) Construct a tree using leaf node analysis and generate the corresponding codes. (3 Marks) ii) Assign the binary code for each character in the data. (3 Marks) iii) Compare the total number of bits required before and after compression. (2 Marks) iv) Encode and decode the word "CABDAB" using the generated codes. (2 Marks)	10	K3
2		Develop an online library management system that allows users to search, borrow, and return books. The system should include the following functionalities: • User Management: Users can register, log in, and update their profiles. • Book Management: The system maintains records of books, including title, author, ISBN, and availability status. • Borrowing & Returning: Users can borrow books,	10	K3

			check due dates, and return them before the deadline. • Fine Calculation: If a book is returned late, a fine is calculated based on the number of overdue days. • Admin Controls: Administrators can add new books, remove books, and manage user accounts. For the above scenario, identify the essential system components and design a UML Class Diagram that represents the relationships among different entities.		
3			Identify a specialized computing system that utilizes the TMS320C54x processor? Additionally, provide a brief explanation of its architecture and describe how it efficiently processes raw CCD data to produce high-quality images comparable to traditional film?	10	K2
4			A juice vending machine accepts payments in denominations of ₹10, ₹20, ₹25, and ₹50 and dispenses four types of juices: • Sprite - ₹30 • Fanta - ₹40 • Coke - ₹50 • Maaza - ₹25 Develop a programming model that represents the concurrent selection and payment process for purchasing multiple juices. The system must handle the following scenarios: 1. A user inserts random denominations and selects multiple juices in a single transaction. 2. The vending machine should correctly accumulate and validate the inserted amount before dispensing the juice. 3. If the user inserts excess money, the machine should determine and dispense the appropriate change using available denominations. The system should handle simultaneous requests where two or more users interact with the vending machine concurrently	10	K3
5			Assume that the following tasks are real time periodic tasks shown in Table .1. Calculate the CPU utilization and examine whether the given set of tasks is schedulable or not using EDF scheduling algorithm. Draw the Gnatt chart for the same Table .1:	10	K3

Table .1:

Task	Computation Time (C)	Deadline	Period (T)	Priority
T1	3	7	20	
T2	2	4	5	
T3	2	8	10	

All the Best