VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Reg. Number:

Continuous Assessment Test (CAT) – II - Mar 2025

Programme	:	**B.Tech (CSE)**	**Semester**	:	WS 2024-25
Course Code & Course Title	:	BCSE305L & EMBEDDED SYSTEMS	**Class Number**	:	CH2024250501594 CH2024250501599 CH2024250501619 CH2024250501627 CH2024250501632 CH2024250501596
Faculty	:	VIJAYKUMAR P NITISH KATAL SINDHUJA M KIRAN KUMAR M SUHASINI SHARON GIFTSY A L	**Slot**	:	E1+TE1
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.		Consider the given string "AAAAABBBBCCCCDDDD". i)Apply Run-Length Encoding (RLE) and LZ78 compression techniques. Which method achieves better compression, and why? [8M] ii)Compute the final compressed sizes for each.[2M]	10	K3
2.		A special-purpose computing system (handheld health monitoring device) needs to capture ECG, blood pressure, and temperature data while syncing with a mobile app over Bluetooth. i) Propose an optimized architecture that balances performance, cost, and power. [4M] ii) Explain your component selection, highlighting the requirements, challenges, and constraints.[6M]	10	K4

3.		You are working on an embedded system with limited memory and processing power. You are given the following code:
		int x = 10;
		int y = x + 5;
		int z = y * 2;
		int w = z - x;
		if (w > 20) {
		int a = w + 10;
			10	K3

```
    int b = a * 2;
    printf("%d", b);
} else {
    int c = w * 3;
    printf("%d", c);
}
for (int i = 0; i < 10; i++) {
    arr[i] = i * w;
}
```

Write the optimized code by applying suitable optimization techniques for the given code and explain how each optimization technique contributes to the overall efficiency of the program.

4.		A large multi-specialty hospital is undergoing a digital transformation to streamline its services and enhance patient satisfaction. As a system analyst, you are asked to map out all key interactions that take place between different stakeholders including patients, doctors, hospital staff, diagnostic labs, pharmacies, and insurance providers. Your task is to visually represent how these stakeholders communicate and what key services or processes are involved at each stage, from patient onboarding to discharge and follow-up. The hospital management expects a clear depiction of how in-person, online, and automated processes fit into this system. Identify the appropriate UML diagram model to represent the above process.	10	K4
5.		Given the following periodic task set: **Process** | **Computation Time(ms)** | **Period(ms)** P1 | 1 | 4 P2 | 2 | 5 P3 | 1 | 10 a) Determine if this task set is schedulable using **RMS. [2M]** b) Calculate the CPU utilization for RMS **[2M]** c) Draw the time schedule for the first 20 ms under RMS. Assume that time starts at 0. **[6M]**	10	K3

**********All the best **********