

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

IV–B.TECH–I–Semester End Examinations (Regular) - December- 2025

INTRODUCTION TO EMBEDDED SYSTEM

(Common for IT, CSM & CSD)

[Time: 3 Hours]

[Max. Marks: 60]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 10 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(10 Marks)

1. a) List any two differences between embedded systems and general-purpose computers. [1M]
- b) What is meant by "hard real-time systems"? [1M]
- c) State the function of actuators in embedded systems. [1M]
- d) Why is a watchdog timer needed in embedded systems? [1M]
- e) What is cross-compilation in embedded programming? [1M]
- f) Why is memory optimization important in embedded C programming? [1M]
- g) What is a Real-Time Operating System (RTOS)? [1M]
- h) Mention any two factors to consider while choosing an RTOS. [1M]
- i) What is boundary scan testing? [1M]
- j) Why is debugging essential in embedded systems? [1M]

PART-B

(50 Marks)

2. Explain the purpose of embedded systems with suitable examples. [10M]
- OR**
3. Discuss the characteristics of embedded systems with real-world examples. [10M]
4. Describe different types of memory used in embedded systems (ROM types) and compare their roles. [10M]
- OR**
5. Explain about onboard embedded communication protocols? Explain its role, types, and importance in embedded systems development. [10M]
6. Explain the embedded firmware design approach with a neat diagram. [10M]
- OR**
7. Analyze the role of object files and HEX files in embedded firmware development with examples. [10M]
8. Define kernel and discuss different types of operating systems (batch, time-sharing, real-time, embedded OS) with examples. [10M]
- OR**
9. Explain task synchronization techniques including semaphores, mutexes, and event flags. [10M]
10. Describe the board bring-up process including power-on testing, bootloader loading, and peripheral verification. [10M]
- OR**
11. Describe different types of files generated during cross-compilation (object files, map files, hex files, bin files, ELF files). [10M]
