

**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]

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