Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40583

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Sixth/Seventh/Eighth Semester

Electrical and Electronics Engineering

EE 8691 – EMBEDDED SYSTEMS

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is In-circuit Emulator?
2. Define Real Time Clock.
3. Compare RS 422 and RS 485?
4. What are device drivers? Mention their needs.
5. List any three objectives of EDLC?
6. List some of the fundamental issues in hardware software co-design.
7. Write short notes on Interrupt Routines in RTOS?
8. Mention the differences between Process and Thread?
9. Briefly explain various types of ECUs used in the automotive industry.
10. Mention the applications of Embedded systems?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain various memory management methods? (7)

(ii) Discuss memory shadowing and memory selection for an embedded system? (6)

Or

(b) (i) Discuss structural units in embedded processor? (7)

(ii) Explain Watch dog Timer and DMA? (6)

12. (a) (i) Discuss RS 232 standard and CAN bus along with merits and demerits? (8)

(ii) Explain I²C Bus in detail. (5)

Or

(b) (i) Compare pros and cons of CAN bus and I²C bus. (6)

(ii) Explain SPI bus in detail. (7)

13. (a) (i) Explain the various types of tests performed in the development of embedded product. (7)

(ii) Briefly explain Iterative and Incremental life cycle model. (6)

Or

(b) (i) Explain the similarities and differences between Iterative and Evolutionary life cycle model. (6)

(ii) Explain the different phases of EDLC. (7)

14. (a) (i) Explain RTOS and services offered by a real time kernel. (6)

(ii) Explain various task synchronization issues encountered in multitasking systems due to concurrent resource access. (7)

Or

(b) (i) Discuss the functional requirements that need to be addressed in the selection. (5)

(ii) Explain the concept of Multiprocessing and Multitasking and briefly explain types of multitasking. (8)

15. (a) Discuss the case study of Digital camera including components used and subsystems. (13)

Or

(b) (i) Draw and explain the functional block diagram of washing machine. (8)

(ii) Explain various types of serial interface buses deployed in automotive embedded applications. (5)

PART C — (1 × 15 = 15 marks)

16. (a) Discuss task communication devices (i) Shared Memory (ii) Pipes (iii) Memory Mapped Objects (iv) Message Queues (v) Signaling. (3 + 3 + 3 + 3 + 3)

Or

(b) (i) Design sequential program model for the 'Seat Belt Warning System'. (7)

(ii) Three processes with process ID's P1, P2, P3 with estimated completion time 4, 6, 5 milliseconds and priorities 1, 0, 3 (0- highest priority, 3-lowest priority) respectively enters the ready queue together. Process P4 with estimated completion time 6 milliseconds and priority 2 enters the Ready' queue after 5 milliseconds. Calculate the waiting time and Turn around time for each process and the average waiting time and Turn around time (assuming there is no I/O waiting for the processes) in non-preemptive priority based scheduling algorithm? (8)