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**Question Paper Code : 20524**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Sixth/Seventh/Eighth Semester

Electrical and Electronics Engineering

EE 8691 — EMBEDDED SYSTEMS

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

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the typical characteristics of embedded systems?
2. What is the need of Watch dog timer?
3. Mention the features of CAN bus.
4. What is the need for device drivers?
5. Why is state machine model essential?
6. Compare dataflow model and finite state model.
7. Define task and task states.
8. Compare preemptive and non-preemptive scheduling.
9. What is an Electronic Control Unit (ECU)? Give its uses.
10. List any six, key players of the automotive embedded market.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Elaborate about the structural units in embedded processor and how a processor is selected for an embedded application? (7)  
(ii) Explain the concept of DMA. (6)

Or

- (b) (i) Explain the various memories used, in embedded systems. (8)  
(ii) Describe the working principle of In-circuit emulator. (5)

12. (a) (i) Explain in detail, about SPI communication protocol and its interfacing techniques. (7)  
(ii) Explain Inter Integrated Circuit Bus in detail. (6)

Or

- (b) (i) Compare the advantages and disadvantages of data transfer using serial and parallel port/devices. (6)  
(ii) Explain RS-232C and RS-485 Serial interfaces. (7)

13. (a) Illustrate in detail, about the different phases of EDLC, with an example. (13)

Or

- (b) (i) Illustrate some of the fundamental issues in hardware software co-design. (7)  
(ii) Illustrate State machine model and sequential program model, with example. (6)

14. (a) Illustrate in detail, about the Inter process Communication and Context Switching. (13)

Or

- (b) Illustrate the following task communication processes.  
(i) Shared Memory (3)  
(ii) Pipes (3)  
(iii) Memory Mapped Objects (3)  
(iv) Message Queues (2)  
(v) Signal (2)

15. (a) (i) Explain various types of serial interface buses deployed in automotive embedded applications? (5)  
(ii) Draw and explain the, functional block diagram of washing machine. (8)

Or

- (b) Explain the process involved in developing a 'Smart card security system' used in banking sector. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Design an object oriented model for ATM machine, and explain its working with necessary diagrams. (15)

Or

- (b) (i) Design a concurrent processing model, for the 'Seat Belt Warning system'. (7)  
(ii) Three processes with process IDs P1, P2, P3 with estimated completion time 10, 5, 7 milliseconds respectively, enters the ready queue together. A new process P4 with estimated completion time 2 ms enters the 'Ready' queue, after 2 ms of execution of P2. Calculate, average waiting time, waiting time, turn around time for each process (assuming there is no I/O waiting time for the processes) using SJF algorithm. (8)