P1569   **[3764]-424**

B.E. (Computer Engineering & I.T.)
EMBEDDED SYSTEMS
(410451) (2003 Course)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates :

    1) Answers to the two sections should be written in separate answer books.

    2) In section I attempt : Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6. In section II attempt : Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12,

    3) Neat diagrams must be drawn wherever necessary.

    4) Figures to the right indicate full marks.

    5) Assume suitable data, if necessary.

SECTION - I

Q1)   a)   List four important characteristics of Embedded Systems.   [4]

     b)   Explain the programmer's model of ARM7.   [8]

     c)   What are the different operating modes of ARM7.   [6]

OR

Q2)   a)   Is ARM7 a RISC processor core? If yes, substantiate your answer with appropriate reasons.   [8]

     b)   What do you mean by CPSR, SPSR and Link Register?   [4]

     c)   List commonly used microcontrollers in small, medium and large scale embedded systems.   [6]

Q3)   a)   Explain 'Automic Operation Unit' found in advanced processors. [4]

     b)   In a voice data compression system, bits are generated at the rate of 64 Kbps. The embedded system with instruction cycle time of 0.02 microsecond is supposed to compress these bits.   [12]

        Select   i)   appropriate processor with suitable structural units and

              ii)   memory for the above Embedded System.

OR

Q4) a) What are the advanced processing units found in the processor architecture? [4]

b) A robot system has four coil stepper motor with 4-bit input and a DC motor requiring one bit pulse width modulation output. The motors need signaling at the rate of 50 to 100 msec. [12]

Select i) appropriate processor with suitable structural units and

ii) memory for the above Embedded System.

Q5) a) Explain LCD interface with an 8-bit Microprocessor or Microcontroller. How the control word and data is written to LCD? [6]

b) Name different features and applications of I2C. [6]

c) What are the pipes and sockets? Explain their uses in Embedded system software implementation. [4]

OR

Q6) a) Explain data transfer mechanism in CAN protocol. Also elaborate on arbitration method used in CAN. [8]

b) Explain the following for USB protocol : [8]

i) Client Software.

ii) USB System software.

iii) USB Host controller.

iv) USB Topology.

SECTION - II

Q7) a) What is the role of ICE (In Circuit Emulator) in Embedded Systems? Explain in detail. [6]

b) Explain the process of Embedded System development with the help of waterfall model. [12]

OR

Q8) a) What are the advantages of assembly language programming when used for the development of an Embedded System? Name two Embedded System applications where assembly language programming is preferred. [6]

b) How cross compilers are different than compilers? Give two specific instances where one has to use cross compiler. [6]

c) What important features of Embedded Software can be implemented using List - C language data structure? Name two implementations.[6]

Q9) a) What are the different alternatives for RTOS to respond to hardware interrupt calls? Explain with the help of neat diagrams. [10]

b) Name and explain the best strategy for scheduling dynamic RTOS tasks. [6]

OR

Q10) a) Define the following :
i) Worst case latency period.
ii) Dead line.
What are the different timings/factors contribute towards the above timings? [7]

b) What are the different types of RTOS? Give two examples for each type. [6]

c) Name three soft real time scheduling algorithms. [3]

Q11) a) Explain the scheduling algorithm used in Micro C/OS - II. [6]

b) Name and explain the functions of different ports used in implementation of automatic chocolate vending machine. [4]

c) Name and explain tasks and IPCs used for sending bytes from application layer using TCP/IP stack. [6]

OR

Q12) a) Given : A smartcard system is to be designed for contact-less card for a bank. A RTOS is decided to be used for this application. The smartcard is expected to have all the security features required for banking application. Design different tasks and define their functions for the above system. Also explain their synchronization. [8]

b) What is adaptive cruise control embedded system? Explain with the help of neat block diagram. What controls are provided to the driver for this purpose? [8]

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