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M.Tech (VLSI) Semester-I Examination. 2014 Session : 2014-2015

Discipline : Electronics & Communication Engineering

Paper Code : VLSI 5131 Paper Name : Embedded Systems

Time Allotted : 3 hrs Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: 10 x 1=10

(i) What is the address range of SFR Register bank?

(a) 00H-77H (b) 40H-80H
(c) 80H-7FH (d) 80H-FFH

(ii) UART device

(a)receives parallel data and stores as parallel data (b)receives serial data and stores as serial data
(c)receives serial data and stores as parallel data (d)receives parallel and stores as as serial data

(iii) Which pin of port 3 has an alternative function as write control signal for external data memory?

(a)P3.8 (b)P3.3
(c)P3.6 (d)P3.1

(iv) After reset, SP resistor initialize to address

(a)8H (b)9H
(c)7H (d)6H

(v) Shift micro-operation shl represents

(a) shift right (b) shift left
(c) rotate right (d) arithmetic shift left

(vi) Embedded system is a _____ system

(a)always single functioning (b)always multi functioning
(c)usually single functioning (d)usually mutli functioning

(vii) In 8051 which interrupt has highest priority?

(a) IE1 (b) TF0
(c) IE0 (d) TF1

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(viii) A reaction timer has the application
(a) to measure time interval between two processor (b) compute the real – time of processor
(c) to measure time a person to stimulus (d) none

(ix) RTL statement T3: R2 ← R1, R1 ← R2 is a
(a) Information transfer (b) Conditional Statement
(c) Concurrent condition (d) none

(x) Protocol that perform Parallel Communication:
(a) CAN (b) I2C
(c) PCI (d) none

Group - B

2.(a) Classify Embedded System. Write down some application area of Embedded System. Give an example of an Embedded System with its block diagram.

(b) Obtain the FSM for a sequence detector to detect the overlapping sequence 0101. Assume that the detector has one input line to place the sequence and one output line to indicate the result of detection. Realise the FSM using one-hot assignment method. (2+2+2) + (3+3) = 12

3.(a) What is I2C? What are the bits in I2C correspond to? Draw and explain the diagram of a physical I2C bus and devices.

(b) Write down the algorithm to write a data on slave on I2C bus. How to read a data from slave? – Explain with example. What are the disadvantages of I2C. (2+1+3) + (2+3+1) = 12

Group - C

4.(a) Write a C program for a GCD processor and design FSMD.

(b) Design a control logic unit and data path unit of the GCD processor. 5+7=12

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5.(a) Using the watch dog Timer design ATM that provides the time out condition of 2 minutes.

(b) Draw and describe the operation of a serial communication using CAN protocol? 6+6 = 12

Group - D

6.(a) Describe the different Timer Modes in 8051 microcontroller?

(b) Draw and explain the operating principle of the Timer/counter control logic circuit.

(c) Describe the Timer Mode Control Register of 8051. 7+3+2 = 12

7.(a) Add the unsigned numbers found in internal RAM locations 25H, 26H and 27H together and put the result in RAM locations 30H (MSB of Sum) and 31H (LSB of SUM).

(b) Write a program to generate 2 KHz square wave on pin P1.0 of port 1 of 8051 microcontroller using interrupt. 6+6= 12

Group - E

8.(a) Design an 8 X 4 size EPROM using floating Gate MOSFETs. Explain the operation of a single transistor DRAM cell.

(b) Explain the Cache memory organization. Describe the concepts of memory mapped I/O and I/O mapped I/O. (3+3) + (3+3) =12

9.(a) Explain how a Keypad module can be interfaced with any embedded processor.

(b) Describe the working principle of any LCD controller used in embedded system. (6+6) =12