

Sem VIII COLD

ETRX

MAY/16

EMBEDDED SYSTEMS & REAL-TIME PROG
QP Code :631300

(3 Hours)

[Total Marks:100]

N.B.:

- 1.Question no.1 is compulsory and attempt any 4 from remaining 6 questions
- 2.Assume suitable data wherever necessary

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| Q1. | (a) Compare RISC and CISC architectures | 5 |
| | (b) Compare C-programing and assembly programming | 5 |
| | (c) What are the requirements, challenges, constraints of real time systems | 5 |
| | (d) Describe any two serial communication methods | 5 |
| Q2. | (a) Explain MSP 430 features which supports lowpower applications | 10 |
| | (b) Explaing High performance features of ARM 7TDMI based Processors | 10 |
| Q3. | (a) Compare interrupt structure of ARM and MSP430 | 10 |
| | (b) With the help of suitable examples explain modifiers, macros, List &ordered list | 10 |
| Q4. | (a)What is multitasking? What is need of IPC and synchronization | 10 |
| | (b)What is priority inversion problem? Suggest solutions for the same | 10 |
| Q5. | (a) Explain addressing modes of ARM and MSP430 | 10 |
| | (b) Explain any three types of IPC | 10 |
| Q6. | Design a tea vending machines for dispensing tea against Rs.5 coin.
The system should have necessary, minimal, lowcost features.
Draw block diagram, System model(FSM/Petrinet), Software architecture, list of components | 20 |
| Q7. | Write short notes on | |
| | (a) Controllor Area Network (CAN) | 5 |
| | (b) Interrupt Vectors, Priorities and Nesting | 5 |
| | (c) List and ordered list in c-programing | 5 |
| | (d)System on chip (SOC) | 5 |
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Q.P. Code : 630702

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**,
 (2) Attempt any **four** out of remaining **six** questions,
 (3) Assume any suitable data whenever required and justify the same.

1. (a) Draw and explain Carry save adder 5
 (b) Design SR flipflop using AOI, write Verilog HDL 5
 (c) Explain electromigration effect in an interconnect. 5
 (d) Write Verilog code for 8 bit counter. 5

2. a) What would be the conductor width of power and ground wires to a 50 MHz clock buffer that drives 100 pF of on-chip load to satisfy the metal-migration consideration ($J_{AL} = 0.5 \text{ mA}/\mu\text{m}$)? What is the ground bounce with chosen conductor size? The module is 500 μm from both the power and ground pads and the supply voltage is 5 volts. The rise/fall time of clock is 1 ns. (Assume sheet resistance of wire = $0.05 \Omega/\text{sq}$). 10
 (b) Draw 1T DRAM cell and explain its write, read, hold and refresh operation. 10

3. (a) Explain 4-bit CLA adder with its carry equations, logical network and write its Verilog description. 10
 (b) Explain in detail the input protection circuit for CMOS, also explain output circuit with I/O circuit 10

4. (a) Give and explain the maximum and minimum frequency calculation of clock signal which determine the data transfer rate through cascade system. 10
 (b) Explain EEPROM using floating gate NMOSFET. 10

5. (a) Give various important parameters affecting switching performance of CMOS circuit. Suggest method to improve it. 10
 (b) Give and explain single phase clock system and explain its drawback. 10

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6. (a) Explain various techniques of clock generation and clock stabilization. **10**
(b) What is cross talk in IC's? Explain various methods to reduce it. **10**
7. Write short notes on (any **three**) **20**
- (a) Frequency compensation in CMOS operational amplifier.
 - (b) MODL.
 - (c) H tree clock distribution.
 - (d) Reliability issues in CMOS circuits
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Q.P. Code : 631202

(3 Hours)

[Total Marks : 100

N.B.: (1) Question No.1 is **compulsory**.(2) Solve **any Four** from remaining **Six** questions.(3) Assume suitable **additional data** if **necessary**.

1. (a) Explain the why Inverse kinematics solution is not unique for generic robots. 5
 (b) What is the tool configuration vector? Explain its role in the solution of an inverse kinematic problem. 5
 (c) Define hard/fixed, soft/flexible automation and hence the relative cost effectiveness of different types of automation with a neat sketch. 5
 (d) Define link and joint kinematic parameters. 5
2. (a) Find the joint position of the tool tip of the Adept One robot when the joint variables are $q = [\pi/4, -\pi/3, 120, \pi/2]^T$ Where $d = [877, 0.0, d_3, 200]^T$ $a = [425, 375, 0.0, 0.0]^T$. 10
 (b) How does the SCARA arm geometry differ from the vertical articulated arm? Why is the SCARA arm more ideal for assembly applications. 10
3. (a) Explain with diagram basic four steps for transferring Frame k-1 to frame k. 10
 (b) Explain the inverse arm kinematics of a two DOF cylindrical coordinate robot arm. 10
4. (a) What is the different between Path & Trajectory? Explain Trajectory planning? 10
 (b) Explain the bounded deviation algorithm for straight line motion of the tool path. 10
5. (a) Explain linear interpolation with parabolic blends. Discuss its advantages over piecewise linear interpolation. 10
 (b) Explain role of line and area descriptors for analyzing shape of an object. 10
6. (a) Explain with ladder diagram PLC system for dispensing oil from tank. 10
 (b) What are the advantages and disadvantages of PLC system. 10
7. Write notes on the following : 20
 - (a) Classification of robots
 - (b) Template matching technique for part recognition
 - (c) Link co-ordination arm equation
 - (d) Robot specification