

(3 Hours)

Total marks: 100

**NB:**

Question No. 1 is compulsory,

Attempt any **four** out of remaining **six** questions,

Assume any suitable data whenever required and justify the same.

1. a) Explain R-C distribution effect of an wire. (5)  
b) Explain electromigration effect in an interconnect. (5)  
c) Draw and explain Carry save adder. (5)  
d) Explain H Tree clock distribution. (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  $\mu\text{m}$  from both the power and ground pads and the supply voltage is 5 volts. The rise/fall time of clock is 1 ns. (10)  
(Assume sheet resistance of wire =  $0.05 \Omega/\text{sq}$ ).  
b) Implement following function using PLA (10)  
$$X = ac + \overline{bc}$$
$$Y = abc + \overline{abc}$$
$$Z = ab + \overline{ab}$$
3. a) Give and explain CLA Adder with generate and propagate term with their verilog code (10)  
b) Draw 6 T SRAM cell, Explain its read and write operation. (10)
4. a) What is the need of sizing routing conductors, how does it affects RC delay? (10)  
b) Explain EEPROM using floating gate NMOSFET. (10)
5. a) What is cross talk in ICs ? Explain various methods to reduce it. (10)  
b) Explain in detail the input protection circuit for CMOS, also explain output circuit with I/O circuit. (10)
6. a) Give and explain single phase clock system and explain its drawback. (10)  
b) Give various important parameters affecting switching performance of CMOS circuit. Suggest method to improve it. (10)
7. Write short note (any 3) (20)  
a) 1 T -DRAM Cell.  
b) Frequency compensation scheme of CMOS Amplifier.  
c) MODL.  
d) Design SR flipflop using AOI ,write Verilog HDL

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## BES [in VIII] (Rev Course) Electronics

## Embedded system of RealTime Programming

QP Code :631302

(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 serial and parallel peripheral interfacing   | 5  |
|     | (c) Compare ARM-7TDMI and MSP430 architectures   | 5  |
|     | (d) Explain MODBUS protocol  | 5  |
| Q2. | (a) For Low power applications which kind of architectural features are desired? Explain with the help of suitable example   | 10 |
|     | (b) What are the optimisation challenges of design metric? Explain with the help of examples   | 10 |
| Q3. | (a) What is interrupt latency? How does it affect realtime behaviour   | 10 |
|     | (b) Explain various c-programing modifiers and their use with the help of examples   | 10 |
| Q4. | (a) What are scheduling policies? Compare any three  | 10 |
|     | (b) What is priority inversion? Explain any example (case study) of the same   | 10 |
| Q5. | (a) Explain Various testing and debugging methodology  | 5  |
|     | (b) Explain embeded product development life cycle model   | 5  |
|     | (c) Draw FSM for automated railway(metro) system, which sense, stops and runs.   | 10 |
| Q6. | Design a medical patient monitoring system to sense and raise alarm. The system should have typical (heart rate/ecg/etc) sensing and alarm features. Draw block diagram, System model(FSM/Petrinet), Software architecture, list of components | 20 |
| Q7. | Write short notes on   |    |
|     | (a) Controller Area Network (CAN)  | 7  |
|     | (b) Interrupt Vectors, Priorities and Nesting  | 7  |
|     | (c) Different types of display units   | 6  |
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( 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) With neat sketch define Joint and Link parameters. 5
- (b) How robots are classified? 5
- (c) Explain how parabolic blends eliminate infinite acceleration points on the trajectory of robots. 5
- (d) Why dexterous work envelope is always smaller than the total work envelope. 5
2. (a) Explain and develop DH algorithm for four axis ADAPT-I SCARA robot. 10
- (b) Compute the joint variable vector  $q = [q_1, q_2, q_3, q_4]^T$  for the following tool configuration vector of SCARA.  $w(q) = [692.82, 25.527, 0.0, -1.6487]^T$ , Where  $a_1 = 425\text{mm}$ ,  $a_2 = 375\text{mm}$ ,  $a_3 = 0$ ,  $a_4 = 0$ , and  $d_1 = 877\text{mm}$ ,  $d_2 = 0$ ,  $d_3 = q_3$ ,  $d_4 = 200\text{mm}$ . 10
3. (a) Explain Inverse kinematic analysis of four axis Robot arm. 10
- (b) For the 5 axis Rhino XR-3 robot arm, use the inverse kinematic algorithm to find the  $q$  when the robot is in the following positions : 10
  - (i) A maximum horizontal reach position
  - (ii) A maximum vertical reach position.
4. (a) Explain how straight line motion can be obtained using articulated robot. 10
- (b) Explain linear interpolation with parabolic blends. Discuss its advantages over piecewise linear interpolation. 10
5. (a) Explain robot pick-and-place operation. 10
- (b) Explain role of line and area descriptors for analyzing shape of an object 10
6. (a) Explain the basic steps involved in bounded deviation algorithm for straight line motion. 10
- (b) Draw and Explain the Ladder Diagram for controlling lubricating oil being dispensed from a tank. 10
7. Write notes on the following : 20
  - (a) Template matching
  - (b) Perspective transformation
  - (c) Workspace fixtures
  - (d) Gross motion planning

( 3 Hours )

[ Total Marks : 100

- N.B.:** (1) Question No.1 is **compulsory**.  
(2) Attempt **any Four** questions out of the remaining **Six** questions.

1. Answer the following questions : 20
  - (a) What is meant by Subnetting and Supernetting? Explain with an example.
  - (b) Compare OSI and TCP/IP.
  - (c) Explain the meaning of "hidden station" and "exposed station" in WLAN.
  - (d) Explain ATM Cell format for NNI & UNI.
2. (a) Explain the different fields of IPv4 Datagram. Compare it with IPv6. 10  
(b) Mention the need for network security. Discuss various security threats and safeguards. 10
3. (a) Differentiate between WDM and DWDM. With a neat schematic diagram, explain DWDM technology. 10  
(b) Bring out the salient features of Wireless LANS. Explain how CSMA/CA is implemented in WLANS with the help of a flow chart. 10
4. (a) With a neat schematic diagram, explain the functional layers of SONET, and its hardware components. Bring out the functionality of each component. 10  
(b) Explain OAM and P and RMON. 10
5. (a) What is a Firewall? What are its advantages and limitations? Explain the different types of Firewalls. 10  
(b) Explain with a neat diagram, the frame relay format and explain the significance of each field. Compare ATM with Frame relay. 10
6. (a) Describe the steps in completing the Access layer design in detail. Compare Ubiquitous and Hierarchical Access network design. 10  
(b) Explain the ATM Protocol architecture , with a neat diagram also explain the functions of ATM layer and Various AAL layers. 10
7. Write short notes on (Any Four) : 20
  - (a) Fragmentation in IPv4
  - (b) DMZ
  - (c) Strategies for transition from IPv4 to IPv6
  - (d) Packet filtering and Layer 7 filtering
  - (e) Comparison of TCP and UDP