

(Revised Course)

Duration: 3hrs.

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 Manchester carry circuits (5)  
 b) Explain how ESD (electro-static discharge) affect the MOSFET (5)  
 c) Write Verilog code for 8 bit counter. (5)  
 d) Draw and explain Carry save adder (5)
2. a) Determine intrinsic gate capacitance with  $t_{ox}=150\text{\AA}$ ,  $V_G=3.3\text{V}$ .  
 $\epsilon=3.9 \times 8.854 \times 10^{-14}\text{F/cm}$ , if  $W=4\mu\text{m}$ ,  $L=2\mu\text{m}$ . (10)  
 b) Implement following function using PLA (10)  

$$X = ac + b\bar{c}$$

$$Y = a\bar{b}c + \bar{a}b\bar{c}$$

$$Z = ab + \bar{a}\bar{b}$$
3. a) Explain various technique of clock generation and clock stabilization. (10)  
 b) Draw 4 X 4 pseudo-nMOS ROM array circuitry having stored following data 0011, 1010, 1100, 0101. Also list the no. of address pins, data pins and word lines (10)
4. a) What is the need of sizing routing conductors, how does it affects RC delay explain? (10)  
 b) Explain EEPROM using floating gate NMOSFET. (10)
5. a) Give and explain CLA Adder with generate and propagate term with their Verilog code. (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) Reliability issues in CMOS circuits.  
 b) Low power design consideration  
 c) Switch capacitor amplifier.  
 d) H tree clock distribution.

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QP Code : 2685

Time: 3 hrs

Total marks : 100

- Note: 1) Q1 is compulsory .Answer any four out of remaining six questions  
2) All questions carry equal marks

- Q.1 Answer the following briefly: (any four) (20)
- Compare OSI model with TCP/IP model.
  - Differentiate between CSMA/CD and CSMA/CA..Why CSMA/CD can not be implemented in Wireless LAN?
  - Explain SONET functional layers with a neat diagram.
  - Explain subnetting and supernetting with an example.
  - Describe remote monitoring. Bring out its benefits .
- Q.2(a) Explain IPv4 datagram format in detail. Compare it with IPv6 (10)
- (b) With a neat diagram, explain the frame format of Frame Relay . Explain how Congestion control and Quality of Service is implemented in it. (10)
- Q.3(a) Explain :(i) OAM &P (ii) Functions of Routers , Bridges and switches in networking (10)
- (b) Mention the need for network security. Explain different security threats and safeguards. (10)
- Q.4(a) Explain fragmentation with respect to IPv4 and illustrate it with an example . (10)
- (b) Explain the hardware components of SONET architecture. Draw the frame format of STS-1. (10)
- Q.5(a) With a neat diagram, explain ATM Cell format. Explain ATM Protocol architecture , bringing out the functions of ATM layer and AAL layer. (10)
- (b) Explain DWDM technology in detail, with a neat schematic diagram of DWDM-architecture., Bring out the advantages of Optical networking . (10)
- Q.6(a) Explain 'Hidden station problem' in Wireless LAN? How is it tackled? With respect to IEEE 802.11 Protocol , explain the following: DCF, PCF , NAV vector. (10)
- (b) Explain : ( i) DMZ (ii) Layer 7 filtering (10)
- Q.7(a) Compare Ubiquitous and hierarchical access in Access Network design. Explain the steps for completing access layer design in detail. (10)
- (b) What is a firewall? What are the capabilities and limitations of firewall? Discuss the different types of firewalls, along with their advantages and disadvantages. (10)

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 QP-Con. 11439-15.

N.B.:

- (1) Question No.1 is compulsory.
- (2) Attempt any four questions out of remaining six questions.
- (3) Assume suitable data wherever required.

- Q1. a) Explain the why Inverse kinematics solution is not unique for generic robots. (5)  
b) What is the differentiate between Hard and Soft Automation (5)  
c) How robots are classified? (5)  
d) Why dexterous work envelope is always smaller than the total work envelope (5)
- Q2 ).a) Explain and develop DH algorithm for four axis ADAPT-1 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  $a_1 = 425mm, a_2 = 375mm, a_3 = 0, a_4 = 0,$  and  $d_1 = 877mm, d_2 = 0, d_3 = q_3, d_4 = 200mm$ . (10)
- Q3.(a) Explain Inverse kinematic analysis of four axis Robot arm. (10)  
(b) Find the composite rotation matrix by rotating the tool about the fixed axis of F frame, with a yaw of  $(\frac{\pi}{4})$ , followed by a pitch of  $(\frac{-\pi}{4})$  and finally a roll of  $(\frac{\pi}{2})$  radians.  
If  $(p)^M = (0, 0, 1)^T$  Find  $[p]^F$  (10)
- Q4.(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)
- Q5.(a) Explain shrink and swell operators. How does swell operator help in image smoothening, explain with an example. (10)  
(b) What are advantages of PLC's explain with examples, also state the specifications of PLC with Industrial application and manufacturer. (10)
- Q6.(a) Compare traditional ladder diagram and PLC ladder diagram with examples. (10)  
(b) Define moments & Identify them as a measure of similarity between any 2 regions (10)
- Q7. Write short notes on any two (20)  
(a) Template matching (c) Workspace fixtures  
(b) Perspective transformation (d) Gross motion planning

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Duration: 3 Hour

Max Marks 100

NB: 1) Question no. 1 is compulsory and attempt any 4 questions from remaining 6 questions

2) Assume suitable, appropriate data, specifications wherever necessary.

- Q1 (a) Interface a light/photo sensor with any controller/processor 5
- (b) Explain operating modes of ARM7TDMI 5
- (c) What are benefits of using MACRO and Function in an embedded c-application 5
- (d) What is RS485? Describe its features in detail and give its applications 5
- Q2 (a) Describe any embeded system case as an case study example 5
- (b) How low power features are implemented in MSP430? Explain with the help of clock module. 10
- (c) What is pipeline architecture? What is advantage and related challenges in ARM 5
- Q3 (a) Explain instructions and features of ARM7TDMI which support multiple data transfer and stack operation 10
- (b) What is real time system challenges? What is role of interrupt latencies, context-switching in real time system? 10
- Q4 (a) Compare ARM7TDMI architecture with MSP430 10
- (b) What is advantages and disadvantages of C-language vs assembly language 5
- (c) What is use of Stack, Queue, List, Pointer 5
- Q5 (a) Determine if the following tasks are schedulable if scheduled according to earliest deadline first policy, also calculate average waiting time and turn around time. 10
- Task            Execution time            Deadline
- T1              24                            30
- T2              12                            45
- T3              06                            29
- (b) What is preprocessing? What are Preprocessing-Directives? 5
- (c) What are the priority inversion problems? 5
- Q6 Design an embeded system to control a simple pick and place robotic arm. For this design 10
- (a) Describe system functioning using appropriate method/model 5
- (b) Draw hardware block-diagram of the system 5
- (c) Describe component selection and hence list of components 5
- (d) Show software modules/functions/drivers and relation/communication between 5
- Q7 Write short notes on 20
- (a) CAN arbitration and Frames
- (b) Compare Pipe vs Message-Q and Counting semaphore vs Mutex.
- (c) Advantages and disadvantages of SCI and SPI over parallel