(03 Hours)   Total Marks (80)

Note:
1) Question No 1 is Compulsory.
2) Answer any three from the remaining questions.
3) Assume suitable data wherever required

Q1. Solve **any four** of the following   **(20)**

a. Compare Full Custom and Semi-Custom design.

b. Write short note on Static CMOS Design

c. Implement the function F= $\overline{((D + E + A).(B + C))}$ using standard CMOS logic

d. Implement 4 X 4 NAND based ROM array.

e. Write short notes on Sense Amplifier.

Q2.a Explain Constant Voltage and Constant Field Scaling in detail with their advantages and disadvantages.   **(10)**

b. Explain CMOS inverter characteristics mentioning all regions of operation.   **(10)**

Q3.a Compare Pass transistor logic, NMOS logic and CMOS logic.   **(10)**

b. Explain read and write operation of 1 T DRAM cell.   **(10)**

Q4.a What are the drawbacks of dynamic CMOS logic? Show the modification in dynamic CMOS logic to overcome its drawback.   **(10)**

b. Calculate noise margin of a CMOS inverter with the given parameters: **(10)**
NMOS $V_{TO,n}$ =0.6V, u_nC_{ox} = 60 uA/V^2, (W/L)n = 8,
PMOS $V_{TO,p}$ = -0.7V, u_nC_{ox} = 20 uA/V^2, (W/L)p = 12,
V_{DD} =3.3 V.

Q5.a Draw JK flip flop using CMOS and explain the working.   **(10)**

b. Draw Carry Look Ahead Adder chain using Dynamic CMOS Logic.   **(10)**

Q6. Solve **any 4 out of 5** carry equal marks   **(20)**

a. Channel Length Modulation

b. Noise Margin

c. Pseudo -n-MOS

d. 4 X 4 Barrel Shifter

e. Flash Memory

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Duration: 3hrs   **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
          (2) Attempt any three questions out of the remaining five.
          (3) All questions carry equal marks.
          (4) Assume suitable data, if required and state it clearly.

Q1.	Attempt any FOUR	[20]
a	Differentiate between LAN, MAN & WAN	[05]
b	Explain HUB & Switch with the help of suitable diagram	[05]
c	Differentiate between Pure Aloha & Slotted Aloha	[05]
d	Draw IP Version 4 header Format	[05]
e	Explain Open Loop Congestion Control Technique	[05]
Q2. a	Explain various network topologies with the help of suitable diagram & list the advantages & disadvantages of each network topology	[10]
b	Explain various guided & unguided transmission media with the help of suitable diagrams. Also compare the major difference between guided & unguided transmission media	[10]
Q3. a	Explain Stop-And-Wait ARQ Protocol & list the advantages & disadvantages of Stop-And-Wait ARQ Protocol	[10]
b	Compare Stop-And-Wait ARQ, Go-Back-N ARQ & Selective Repeat ARQ flow control techniques	[10]
Q4. a	Explain Non-Persistent, 1-Persistent & P-Persistent CSMA with the help of suitable diagram	[10]
b	Explain Time Slot Interchange Switch with the help of suitable diagram	[10]
Q5. a	Explain Crossbar Switch with the help of suitable diagram	[10]
b	Explain UDP header with the help of suitable diagram & list the applications of UDP	[10]
Q6. a	Explain Domain Name System (DNS) in application layer with the help of suitable diagram	[10]
b	Write a short note on ADSL	[10]

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(3 Hours) **[Total Marks: 80]**

N.B.: (1) Question No. 1 is Compulsory.

    (2) Attempt any three questions out of the remaining five.

    (3) Each question carries 20 marks and sub-question carry equal marks.

    (4) Assume suitable data if required.

Q1. (a) Derive Poisson's and Laplace equation. (5)

    (b) Explain boundary conditions of E and H fields for two media. (5)

    (c) Explain the radiation resistance, directivity, Beam-width and directive gain of the antenna. (5)

    (d) What is polarization? Explain all types of polarization. (5)

Q2. (a) Derive Maxwell's equations in integral and point form for static field. (10)

    (b) State and Explain Poynting vector using modified Ampere's law, derive the pointing (10) theorem and describe the significance of each of its terms.

Q3. (a) Derive an expression for reflection and transmission coefficient for normal incidence (10) in case of reflection from perfect dielectric.

    (b) Classify and Explain different types of wave Propagation and define the terms (10) Critical frequency, Virtual height, Maximum unstable frequency and Skip distance.

Q4. (a) Drive the expression for radiation resistance in far field region of an Infinitesimal (10) dipole antenna.

    (b) Derive an expression for transmission line equation. (10)

Q5 (a) State Poynting Theorem and derive the expression for Poynting Vector. (10)

    (b) Write a note on Smith chart and explain the steps to calculate SWR from the chart. (10)

Q6. (a) Write the generalized Maxwell's Equations in point form and integral form. (10)

    (b) Explain the factors affecting the field strength of space wave signal. (10)

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(3 Hours)   **[Total Marks: 80]**

N.B.: (1) Question No. 1 is **Compulsory**.
    (2) Attempt any **three** questions out of the remaining **five**.
    (3) Each question carries 20 marks and sub-question carry equal marks.
    (4) Assume suitable data if required.

1. (a) Analyze the important issues faced during Hardware-Software Co-design. (5)
   (b) Compare White-Box and Black-Box testing. (5)
   (c) Draw program model CDFG control data flow graph to calculate the roots of quadratic equation. (5)
   (d) What is the Need of RTOS in Embedded system? (5)

2. (a) Draw and explain Waterfall Model used in Embedded Product Design Life-Cycle (EDLC) (10)
   (b) Demonstrate with examples Classification of embedded systems. Discuss various characteristics of the same. (10)

3. (a) Draw an architecture of the ARM Cortex-M3 and discuss its any three important features (10)
   (b) List and explain Design metrics of Embedded system with suitable graphs wherever necessary. (10)

4. (a) Discuss the differences between RISC and CISC cores. Which of them is used in the embedded systems? Why? (10)
   (b) Write in detail about types of memories required in the embedded system. (10)

5. (a) Compare i) RS-232, RS-485   ii) Bluetooth, Zig-Bee. (10)
   (b) Analyze the significance of Low Power modes in Cortex-M3 (10)

6. (a) Design Automatic Railway Ticket Vending Machine highlighting
     i. Specification requirements (choice of components),
     ii. Hardware architecture
     iii. Software architecture (10)
   (b) Discuss with one example each following:
     i. Hardware testing tools
     ii. Software testing tools (10)

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