

(3 Hours)

(Total Marks: 80)

Please check whether you have the right question paper.

- N.B.:**
- 1) Question No.1 is compulsory.
 - 2) Answer any Three out of remaining five questions
 - 3) Draw the neat diagrams wherever necessary.

Q1.

- A] What is MEMS? Give two examples of MEMS devices which are characterized by sensors and actuators. **5**
- B] What are polymers? Discuss its role in MEMS fabrication. **5**
- C] Explain the steps in standard RCA cycle, during wafer cleaning. **5**
- D] Explain packaging challenges in MEMS devices. **5**

Q2.

- A] What are different silicon compounds. Explain their characteristics and uses in MEMS device fabrication. **10**
- B] State various physical vapor deposition techniques. Explain in brief any one technique of PVD in MEMS fabrication. **10**

Q3.

- A] Explain the process of photolithography in detail. **10**
- B] Distinguish between Wet and Dry etching process with suitable applications. **10**

Q4.

- A] Describe the representative process flow for fabricating the cantilever structure. **10**
- B] Define reliability in MEMS devices. Explain it using bath-tub-curve. **10**

Q5.

- A] Explain in detail, fabrication steps for MEMS microheater. **10**
- B] Differentiate between surface and bulk micromachining with suitable examples. **10**

Q6. Write short note on: **20**

- A] MEMS sensors in IoT applications.
- B] Selection of MEMS material based on applications.
- C] Wafer bonding techniques.
- D] MEMS device characteristics.

[Time: 3 Hours]

[Marks: 80]

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- N.B: 1. Question.No.1 is compulsory.
2. Attempt any three questions from the remaining five questions.

- Q.1 Answer the following: **20**
- Explain the authentication process in GSM.
 - Discuss the need for 3G cellular networks.
 - If there are 50 channels in a cell to handle all the calls and the average call holding time is 100s/call, how many calls per hour can be handled in this cell with a blocking probability of 2%? For number of channels = 50 and $P_b = 2\%$ Traffic intensity in Erlangs is 40.3.
 - Explain the Forward and Reverse channel structure in CDMA.
- Q.2 a) Explain GSM frame and time slot structure. **10**
b) Explain GSM signaling and protocol architecture. **10**
- Q.3 a) Explain CDMA reverse channel processing. **10**
b) Discuss mobility and resource management in CDMA. **10**
- Q.4 a) Explain 4G-LTE architecture with a neat block diagram in detail. **10**
b) Explain cell splitting. **04**
If the radius of each new microcell is half that of the original cell, show that **06**
- Traffic load increases four times
 - Transmit power must be reduced by 12dB to maintain the S/N requirement with a path loss exponent of 4.
- Q.5 a) Explain UMTS network architecture in detail with interfaces. **10**
b) Compare the characteristics of WCDMA and CDMA 2000. **05**
c) Explain GPRS network architecture. **05**
- Q.6 Write short notes on: **20**
- Trunking and GoS
 - Mobile IP
 - MANET
 - Interfaces used in GSM systems

[Time: 3 hours]

[Max Marks 80]

- 1) Question no. 1 is compulsory
- 2) Solve any three from the remaining five questions.
- 3) Assume suitable additional data if necessary.

Q1) Answer the following questions:

- a) Define the following terms: Tool Path, Tool Trajectory, Degree of Freedom, Precision and Accuracy. (05)
- b) Define robot kinematic parameters. (05)
- c) Define total work space envelope and dexterous work space envelope. (05)
- d) Explain 'Histogram' and its significance in robot vision. (05)

Q2) a) Explain significance and use of DH algorithm. Develop DH representation of a four axis SCARA robot and obtain its arm matrix. (15)

b) Explain the significance of major and minor axes. (05)

Q3) a) Explain four fundamental operations for merging of frame k-1 with frame k. Obtain the general link coordinate transformation matrix T for mapping the (k-1)th frame into the kth frame. (10)

b) Explain robot motion planning using Bug 1, Bug 2 and tangent algorithm. (10)

Q4) a) Develop the Inverse Kinematic solution for a three-axis planar robot having joint combination as – RRR, base –shoulder – tool roll. (10)

b) Explain role of line and area descriptors for analyzing shape of an object. (10)

Q5) a) What are Generalised Voronoi Diagrams (GVDs) and role played by them in robot motion planning. (10)

b) Explain template matching algorithm and its use in robot vision. (10)

Q6) Write short notes on. (ANY TWO)

- a) Inverse Perspective transformation (10)
- b) Visibility Graphs (10)
- c) Lagrangian Mechanics (10)
- d) Cartesian space trajectory (10)

(3 Hrs.)

Total Marks: 80

Please check whether you have got the right question paper

- N. B. 1. Question No 1 is compulsory.
2. Solve any three from remaining.

Q1. Solve any four (20M)

- How network connection is established in Bluetooth?
- Explain with diagram DWDM.
- What is VoFR?
- Draw NNI and UNI header format for ATM?
- What is proxy firewall?

Q2. a. Compare IEEE 802.15.1, IEEE 802.15.3a & IEEE 802.15.4 (10M)

Technologies

b. Write in brief note on Radio Frequency Identification (10M)

Q3. a. Draw and explain SONET frame format. (10M)

b. Explain Frame Relay (FR) frame format in detail. (10M)

Q4. a. Explain B-ISDN reference model for ATM (10M)

b. Compare all ATM Adaptation layers: AAL1, AAL2, AAL3/4 and AAL5. (10M)

Q5. a. Compare Ubiquitous and Hierarchical Access and explain the steps or completing the access network design in detail. (10M)

b. What is SNMP protocol? Explain MIB in detail. (10 M)

Q6. Write a note on: Any Four (20M)

- Security Threats and Safeguards
- RMON
- NAT, SNAT and DNAT
- Wireless Sensor Networks
- Bluetooth Protocol Stack

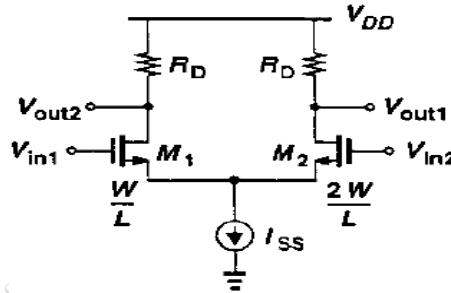
Time: 3 Hours

Max Marks: 80

- N.B. 1) Question No.1 is compulsory
 2) Solve any three questions from the remaining questions.
 3) Assume suitable data if necessary.

1 Solve the following.

- (a) Analyze following circuit to get voltage gain equation if M2 is twice wide as that of M1 and $V_{in1}=V_{in2}$ 5



- (b) Explain the concept of switched capacitor circuit 5
 (c) Compare performance of various op-amp topologies 5
 (d) Explain System on Chip and System in Package. 5
- 2 (a) Design two stage operational amplifiers that meet the following specifications 20
 with a phase margin of 60. Assume the channel length is to be $1\mu\text{m}$, $K_N' = 100\mu\text{A/V}^2$, $K_P' = 20\mu\text{A/V}^2$, $V_{TN} = |V_{TP}| = 0.5\text{V}$, $\lambda_N = 0.06\text{V}^{-1}$, and $\lambda_P = 0.08\text{V}^{-1}$. $A_v > 5000\text{v/v}$, $V_{dd} = 2.5\text{V}$, $V_{ss} = -2.5\text{V}$, $\text{GBW} = 5\text{MHz}$, $C_L = 10\text{pf}$, $\text{SR} > 10\text{v}/\mu\text{sec}$, $V_{out\text{ range}} = \pm 2\text{V}$, $\text{ICMR} = -1\text{ to }2\text{V}$, $P_{diss} \leq 2\text{mw}$.
- 3 (a) Derive expression for voltage gain A_V and output resistance R_o of source 10
 follower stage.
 (b) Compare full custom and semi-custom design in terms of its trade-off and 5
 applications.
 (c) Explain Non-ideal effects in PLL. 5
- 4 (a) Derive equation of differential gain, common mode gain and CMRR of 10
 differential amplifier.
 (b) Explain White & Flicker noise in MOSFET. Derive equation for output and 10
 input referred noise voltage of CS stage
- 5 (a) Draw and explain AMS design flow. 10
 (b) Draw and explain discrete time integrator along with the output waveform. 10

6 Write short note on **any four**

- (a) Band Gap references
- (b) Cascode current mirror circuit.
- (c) Advantage and disadvantages of DLL
- (d) Stability and frequency compensation of two stage Opamp
- (e) Performance parameters of VCO

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