**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: EE6303- Linear Integrated Circuits & Applications**

**UNIT I IC FABRICATION**

**PART A**

1. Write the chemical reaction in the epitaxial growth process of pure Silicon
2. What are the advantages of Integrated circuits over discrete component circuits?
3. Explain why Inductors are difficult to fabricate in IC’s
4. List out the reaction compounds and doping hydrides used in Chemical Vapour Deposition?
5. What is Ion Implantation? Why it is preferred over diffusion process?
6. What are the different levels of Integration?
7. Give classification of Integrated circuits.
8. What do you mean by monolithic process?
9. Explain importance of SiO2 layer.
10. Name the parameters which govern the thickness of the film in the oxidation process
11. Compare Dry oxidation and Wet oxidation
12. What is the step taken to avoid material defect in Ion Implantation?
13. What is meant by dielectric isolation in IC fabrication?
14. Name different types of IC packages
15. What is the need of buried layer in fabrication of monolithic integrated transistor?
16. What is meant by parasitic capacitance in an IC?
17. Name different methods used in fabrication of Integrated Resistors?
18. Define an Integrated circuit
19. What is Epitaxial growth?
20. What is meant by Planar technology?
21. What are the limitations of Integrated circuits
22. Differentiate thin film and thick film technology in IC fabrication
23. What are the different linear IC packages?

**PART B**

1. Describe in detail any two isolation technique used to provide isolation between various components in IC fabrication with illustrations?
2. Explain in step by step basis, the fabrication of Planar P-N Junction Diode with neat illustrations
3. Describe the Epitaxial growth process and photolithography process with neat diagram
4. Give the various ways for making Integrated Resistor
5. Explain in detail about the processing steps involved in the fabrication of monolithic Integrated Circuit
6. Describe in detail about the Oxidation process of IC fabrication
7. Explain the process of Crystal growth and Wafer preparation in detail
8. Describe in detail about the diffusion process of IC fabrication
9. Explain in detail about Ion Implantation and Metallization in detail
10. Discuss the methods used for fabricating IC Resistors, Capacitors and Inductors
11. Completely describe in detail the various stages involved in the fabrication of R, C and transistor in a single chip
12. Explain the basic Planar processes in IC fabrication with neat diagrams
13. Explain the fabrication process of Transistors and FET’s

**UNIT II CHARACTERISTICS OF OPAMP**

**PART A**

1. What is the input impedance of a non-inverting amplifier?
2. What are the different kinds of packages of IC 741?
3. Mention the important ideal characteristics of an OP AMP.
4. Draw the frequency response characteristic of an AC Integrator and indicate the part where it behaves as a True Integrator?
5. State the causes for Slew rate in an operational amplifier? How it is indicated?
6. Define CMRR? State its ideal value
7. What is an operational amplifier?
8. What is input offset voltage?
9. What is input bias current and input offset current?
10. What is PSRR? What should be its ideal value?
11. What is slew rate? What causes the slew rate? State slew rate equations.
12. Draw the typical frequency response of the op-amp
13. Why frequency compensation is required?
14. Mention linear and non-linear applications performed by an operational amplifier
15. Compare inverting and non-inverting amplifiers
16. What is an unity follower? Give its schematic and applications.
17. How to obtain the average circuit from the inverting summer?
18. Draw the integrator circuit using op-amp. Give its output equation.
19. List the applications of Integrator circuit
20. Draw the circuit diagram of an ideal differentiator. Write expression for its output.
21. Why Integrators are preferred over differentiators in analog computers
22. Determine the output voltage of a differential amplifier having differential gain 2000 and the CMRR 100 dB
23. Give the four differential amplifier configurations
24. An input of 3V is fed to the non-inverting terminal of an operational amplifier. The amplifier has Ri of 10kΩ and Rfof 10kΩ. Find the output voltage

**PART B**

1. Explain the operation of a basic differential amplifier.
2. List the six characteristics of an ideal op-amp and explain in detail. Give the practical op-amp equivalent circuit
3. Explain in detail about DC characteristics of op-amp
4. With a neat circuit diagram and equations, discuss the operation of summer and differentiator using operational amplifier
5. Explain the AC characteristics of an operational amplifier
6. Briefly explain different types of frequency compensation techniques applied to op-amp circuits
7. Deduce the expression for a closed loop voltage gain of a inverting and non-inverting amplifier
8. Explain the working of non-inverting summer with neat circuit diagram
9. Draw and explain the circuit of a V to I and I to V converter
10. Explain the working of Integrator and Differentiator
11. Design an op-amp circuit to give an output voltage Vo=3V1-2V2+5V3, where V1,V2,V3 are inputs
12. Design a practical differentiator circuit that will differentiate an input signal with maximum frequency 150 Hz
13. For the non-inverting op-amp shown in Fig., find the output voltage Vo



1. Determine the output voltage for the following circuit



1. Determine the output voltage Vo and the current Io in the circuit as shown below



1. Obtain the closed loop voltage gain Vo/Vi of the circuit shown below

