Department :**Computer Science and Engineering**

Year & Semester :**III Year & V Semester**

Sub Code & Sub Name :**23OECE351A & Electronic Circuits**

Unit-I

S.No	Part-A Questions
1.	Define the term PN junction diode.
2.	Briefly explain the concept of the depletion region.
3.	Draw the VI characteristics of a PN junction diode.
4.	Define Rectifiers. List the types of rectifiers
5.	State the primary function of a rectifier circuit and list two advantages of a Bridge Rectifier over a Half-wave Rectifier
6.	What is a clipping circuit? Give one application.
7.	Tabulate the difference between Positive Clippers and Negative Clippers.
8.	Define the term Clamping circuit.
9.	Define Zener breakdown.
10.	Contrast the V-I characteristics of an ordinary diode and a Zener diode in the reverse bias region.
11.	Define Zener diode. List two applications of Zener diode.
12.	Explain why Zener diode is called a voltage regulator.
13.	Predict what happens if a diode is reverse biased beyond breakdown.

S.No	Part-B Questions
1.	Describe the construction and working of a PN junction diode with neat diagram and show its V-I characteristics.
2.	Explain the VI characteristics of a PN junction diode under forward and reverse bias conditions with neat diagram.
3.	Discuss brief about the different types of rectifiers.
4.	Apply the concept of rectification to explain the working of a Half-Wave Rectifier with neat diagram and waveform.
5.	Create a comparative table showing differences between Half-wave, Full-wave, and Bridge rectifiers.
6.	Explain the function of filters in rectifier circuits and discuss different types.
7.	Illustrate the working of positive and negative clipping circuits with waveforms.
8.	Explain V-I characteristics of Zener diode with neat diagram and list the applications.
9.	Explain the operation of Zener diode as a voltage regulator.
10.	Differentiate between Avalanche and Zener breakdown with diagrams.
11.	Use the concept of rectification to justify why bridge rectifier is preferred in practice.

Unit-II

S.No	Part-A Questions
1.	What is the purpose of biasing a transistor?
2.	What is the operating (Q) point in a transistor circuit?
3.	Name two biasing methods for BJT.
4.	What is a stability factor in biasing circuits?
5.	What happens if no biasing is applied in an amplifier?
6.	Which biasing circuit offers better stability and why?
7.	What happens to collector current if β increases in a fixed bias circuit?
8.	What is the effect of temperature on V_{BE}?
9.	Why is an emitter resistor used in BJT biasing?
10.	State one method to improve thermal stability of a biasing circuit.

S.No	Part-B Questions
1.	Explain the construction, and Modes of operation of BJT. Compare the characteristics of Common Base, Common Emitter and Common Collector.
2.	Compare fixed bias, emitter bias and voltage divider bias circuits in terms of stability, dependence on β etc.
3.	Draw voltage divider bias BJT network. Derive expressions for I_C, V_{CE} and show how to draw the DC load line.
4.	What is thermal runaway in BJT? Derive the condition for thermal stability.
5.	Design a self bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: V_{CC}=16 V, VBE=0.7 V, V_{CEQ}=8 V, I_{CQ}=4 mA, β=50.
6.	Design a biasing network with given V_{CC}, I_C, V_{CE} and β. Explain all steps.
7.	Design a collector-to-base bias circuit using a silicon transistor such that the stability factor is 20, with given: V_{CC}=16 V, V_{BE}=0.7 V, V_{CEQ}=8 V, I_{CQ}=4 mA, β=50.
8.	Write brief about how transistor works as an amplifier and switch?

Unit-III

S.No	Part-A Questions
1.	What is a single-stage amplifier?
2.	What is the role of the coupling capacitor in a single-stage amplifier?
3.	Define voltage gain of an amplifier.
4.	List two applications of single-stage amplifiers.
5.	What are h-parameters in a transistor?
6.	Why is the single-stage amplifier called a small-signal amplifier?
7.	What is the significance of the hre parameter?
8.	Define hoe in CE configuration.
9.	List the advantages of using h-parameters.
10.	How do h-parameters vary with transistor configuration?
11.	Write the four h-parameters for a transistor.
12.	What does hfe represent?
13.	What are the units of h-parameters?
14.	Which h-parameter represents input impedance in CE configuration?

S.No	Part-B Questions
1.	Derive expressions for input impedance, output impedance, voltage gain, and current gain of a CE amplifier using h-parameters.
2.	Draw and explain the frequency response of a single-stage CE amplifier.
3.	Compare CE, CB, and CC amplifiers based on gain, input/output impedance, phase shift, and applications.
4.	A CE amplifier uses the following parameters: hie=1.1 kΩ, hfe=100, hre=2.5×10^{-4}, hoe=25 μS, Load resistance RL=2.2 kΩ. Find voltage gain (Av), input impedance (Zin), Output impedance (Zout).
5.	h-parameter equivalent circuit of CE amplifier: hie=1.2 kΩ, hfe=120, hre=1×10^{-4}, hoe=20×10^{-6} S, RL=1.5 kΩ. Draw and explain the h-parameter equivalent circuit and calculate the current gain.
6.	Discuss about the classification of single stage amplifier.

Unit-IV

S.No	Part-A Questions
1.	What is feed back and what are feed back amplifiers?
2.	What is meant by positive and negative feedback?
3.	What are the advantages and disadvantages of negative feedback?
4.	Differentiate between voltage and current feedback in amplifiers
5.	Define De-sensitivity
6.	List two effects of feedback on amplifier characteristics.
7.	How does an oscillator differ from an amplifier
8.	What are the conditions for sustained oscillator.
9.	State the significance of Oscillator circuit
10.	What are the classifications of Oscillators?
11.	Give the topology of current amplifier with current shunt feedback
12.	State how the frequency for RC phase shift oscillator is calculated.
13.	What is the minimum value of hfe for the oscillations in transistorized RC Phase shift oscillator?
14.	Define LC oscillator.
15.	Name two low frequency oscillators

S.No	Part-B Questions
1.	Explain the concept of feedback as applied to electronic amplifier circuits. Also mention advantages and disadvantages of positive and negative feedback.
2.	Draw and explain the general block diagram of a feedback amplifier, clearly describing how the output signal is sampled and mixed with the input.
3.	Define feedback in the context of amplifiers. Differentiate between Positive Feedback and Negative Feedback
4.	Explain the effect of applying negative feedback on various amplifier characteristics. Justify why negative feedback is preferred in practical amplifier design.
5.	Describe the four basic feedback topologies based on their method of sampling and mixing.
6.	Analyze all types of feedback topologies and prepare a comparison table showing how different negative feedbacks affect amplifier characteristics.
7.	Define an oscillator. Classify different types of oscillators.
8.	Deduce the Barkausen Criterion for the generation of sustained oscillations.How are the oscillations initiated.
9.	Draw the circuit and explain the principle of operation of RC phase-shift oscillator circuit. Derive the expression for the frequency of oscillations.
10.	Derive the expression for the frequency of Hartely oscillators
11.	Derive the expression for the frequency of Colpitt’s Oscillators.
12.	Compare and contrast the operation and tank circuit structure of a Hartley Oscillator and a Colpitt's Oscillator.
13.	Differentiate between Voltage feedback configuration and Current feedback configuration.

Unit-V

S.No	Part-A Questions
1.	Define an operational amplifier.
2.	What is the input impedance of an ideal op-amp?
3.	List any two characteristics of an ideal op-amp.
4.	What is the function of a differential amplifier?
5.	Define Common Mode Rejection Ratio (CMRR).
6.	What is the significance of the slew rate in op-amps?
7.	What is virtual ground in an op-amp circuit?
8.	Name any two applications of op-amps.
9.	What is the function of an inverting amplifier?
10.	State the role of feedback in op-amp circuits.
11.	What is an integrator using an op-amp?
12.	Write the formula for gain in a non-inverting amplifier.
13.	What is the function of a comparator circuit?
14.	Define input offset voltage.
15.	What is the difference between open-loop and closed-loop op-amp configurations?

S.No	Part-B Questions
1.	Explain brief about the classification of IC's.
2.	Design a non-inverting amplifier with a gain of 5 using appropriate resistor values.
3.	Explain the working of a non-inverting amplifier and derive the gain formula.
4.	Derive the expression and working of an op-amp integrator. For an input of 1 V DC, R = 10 kΩ, C = 0.1 µF, find output after 1 ms.
5.	Derive the output voltage of a differentiator using op-amp. For R = 10 kΩ, C = 0.01 µF, find output if input is a 1 kHz sine wave of 1 V peak.
6.	Explain the concept of virtual ground and apply it to an inverting amplifier design.
7.	Explain and design an op-amp as a comparator. *Problem:* Given reference voltage = 2.5 V, input = 1 V to 4 V ramp, plot and explain output.
8.	Design and explain an inverting amplifier for a gain of -10. Input voltage = 0.5 V; Rf = 100 kΩ, find Ri and output voltage.
9.	Explain summing amplifier (inverting type). If three inputs of 1 V, 2 V, and -1 V are applied through 10 kΩ resistors and Rf = 10 kΩ, find output voltage.
10.	Explain brief about RC phase shift oscillator.
11.	Explain brief about OP-AMP: Ideal characteristics and its modes of operation.