

DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

SRM NAGAR, KATTANKULATHUR-603203

ELECTRONIC DEVICES AND CIRCUITS - (EC6202)

ANNA UNIVERSITY QUESTION BANK

UNIT I (PN JUNCTION DEVICES)

PART A

1. Define valence band, conduction band.
2. What is a semiconductor or intrinsic semiconductor?
3. What is meant by N-type and P-type semiconductor?
4. Define the term the drift current.
5. What is diffusion current?
6. What is a PN junction diode?
7. Explain the terms knee voltage and breakdown voltage?
8. Define and explain peak inverse voltage (PIV)
9. Define Static resistance and Dynamic resistance?
10. What is an LED? Draw its symbol.
11. Mention some characteristics of LASER diode.
12. Mention some applications of LASER diode.
13. What is a rectifier?
14. Define recovery time of a diode.
15. Define forbidden energy gap.
16. Define barrier potential.
17. State the relationship between diode capacitance and the reverse bias voltage.
18. What is avalanche breakdown in PN junction diode?
19. Define: Ripple factor.
20. Write down and explain junction diode equation.

PART B

1. Discuss drift current and diffusion current and derive equations for it.
2. Explain the construction and working of Zener diode with a neat sketch.
3. Explain the working of centre tapped full wave rectifier(with and without filter) with neat diagrams and derive the necessary equations.
4. Explain the effect of temperature of a diode.
5. Explain the principle and operation of LASER diode with neat diagram.
6. Explain the principle and operation of Full wave and Half wave rectifier with neat diagram.
7. Explain the construction and working of LED with its characteristics.
8. Explain the effect of temperature of a diode.
9. Discuss about Zener shunt regulator.
10. Describe the operation of the p-n junction diode with V-I characteristics.

UNIT – II (TRANSISTORS)

PART A

1. Why base is made thin in BJT?
2. List the applications of IGBTs.
3. What are the advantages of IGBTs?
4. Draw the two transistor model of SCR.
5. What is meant by latching current & holding current?
6. What is intrinsic stand off ratio of a UJT?
7. Differentiate Enhancement MOSFET and Depletion MOSFET
8. Differentiate JFET and MOSFET?
9. What is MOSFET?
10. Define amplification factor of JFET?
11. Mention the advantages of FET over BJT?
12. Compare BJT and JFET
13. What is thermal runaway?
14. How a transistor is used as a switch?
15. What is FET?
16. Why the input impedance in FET is very high in comparison with BJT?
17. Compare the performance of CE, CB, CC
18. How thermal runaway can be avoided?
19. Explain the significance of Base width modulation (Early effect)
20. Define the different operating regions of transistor.

PART B

1. Explain the input and output characteristics of a CE transistor configuration. List out the comparisons between CE, CB and CC configurations.
2. Draw and explain the characteristics of CC configuration.
3. Describe the static input and output characteristics of a CB transistor with neat circuit diagram.
4. With a neat sketch explain the construction and characteristics of enhancement MOSFET.
5. With a neat sketch explain the construction and characteristics of DEMOSFET.
6. Explain the construction of N channel JFET and also explain the drain and transfer characteristics of the same.
7. Explain the construction and characteristics of UJT with a neat sketch.
8. With a neat sketch explain the construction and working characteristics of IGBT.
9. Explain the two transistor model of a thyristor in detail.
10. With a neat sketch explain the construction and working characteristics of a SCR.

UNIT III (AMPLIFIERS)

PART A

1. Write the procedure to draw the a.c. equivalent of a network.
2. What is meant by hybrid parameters?
3. Define frequency response.
4. Draw the hybrid model of CE amplifier.
5. What is the effect of coupling capacitors at low frequency?
6. What is the effect of coupling capacitors at high frequency?
7. Give the condition for Approximate analysis of small signal model.
8. What is meant by gain bandwidth product?
9. What are the high frequency effects?
10. Give the significance of coupling and bypass capacitor on BW of amplifiers.
11. State the reason for fall in gain at low and high frequencies.
12. Write short note on effects of coupling capacitor.
13. Define the frequencies f_T & f_β .
14. Draw the low frequency incremental model of FET.
15. Draw the frequency response curve of an amplifier.
16. Define upper and lower cut off frequencies of an amplifier.
17. List out the application and characteristics of CE amplifier.
18. Mention some application of CC amplifier.
19. State the reason for choosing 3 db point to determine the bandwidth.
20. What is 3 db frequency?

PART B

1. Explain about CE amplifier and derive the expression for h parameters of the same. Also derive the expression for gain, input impedance and output impedance of CE amplifier.
2. Explain about CB amplifier and derive the expression for h parameters of the same. Also derive the expression for gain, input impedance and output impedance of CB amplifier.
3. Explain about CC amplifier and derive the expression for h parameters of the same. Also derive the expression for gain, input impedance and output impedance of CC amplifier.
4. Explain about CS amplifier and derive the expression for gain, input impedance and output impedance and also draw its small signal equivalent circuit.
5. Explain about CD amplifier and derive the expression for gain, input impedance and output Impedence.
6. Explain about low frequency analysis of BJT and also determine the effect of C_s , C_c & C_e on the low frequency response of BJT.
7. Explain about the high frequency response of FET and derive the expression for lower cut off frequency and upper cut off frequency.
8. Discuss the advantages and limitations of multistage amplifier.

9. The differential amplifier has the following values $R_C = 50\text{ K}$, $R_e = 100\text{ K}$ and $R_s = 10\text{ K}$. The transistor parameters are $r_{\pi} = 50\text{ K} = h_{ie}$, $h_{fe} = \beta_o = 2 \times 10^3$, $r_o = 400\text{ K}$. Determine A_d , A_c and CMRR in db
10. The hybrid parameters of a transistor used as an amplifier in the CE configuration are $h_{ie} = 800\Omega$, $h_{fe} = 46$, $h_{oe} = 80 \times 10^{-6}$ and $h_{re} = 5.4 \times 10^{-4}$. If $R_L = 5\text{ K}$ and $R_s = 500\Omega$. Calculate A_i , R_i , A_v , P_i .

UNIT IV (MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER)

PART A

1. What is a differential amplifier? What are its advantages?
2. What are the applications of differential amplifier?
3. What is meant by CMRR of a Differential amplifier?
4. State the different methods of biasing of difference amplifier.
5. Explain the need for constant current source for difference amplifier.
6. Distinguish between common mod signal and differential mode signal
7. Explain how the differential amplifier can be used as an emitter coupled phase inverter.
8. What is the classification of power amplifier?
9. What is a push pull amplifier?
10. What is cross over distortion? How it can be eliminated?
11. What are the advantages of push pull amplifier?
12. What are the different types of neutralization?
13. What is rice neutralization?
14. What is a tuned amplifier?
15. What is a single tuned amplifier?
16. What are the advantages of tuned amplifiers?
17. What are the advantages of stagger tuned amplifier?
18. What is a stagger tuned amplifier?
19. Write any two characteristics of class A amplifier.
20. Write any two characteristics of class B amplifier.

PART B

1. Draw the circuit diagram of an emitter coupled BJT differential amplifier and derive expressions for differential gain, common mode gain, CMRR, input impedance and output impedance.
2. Explain about Class A transformer coupled amplifier and derive the expression for efficiency of the same.
3. Explain about Class B pushpull amplifier and derive the expression for efficiency of the same.
4. Explain with a neat sketch the working of single tuned voltage amplifier using FET.
5. Explain about Class AB amplifier in detail. Give its advantages and disadvantages.

6. Explain about Class A RC coupled amplifier and derive the expression for efficiency of the same.
7. With a neat sketch explain stagger tuned amplifier
8. Explain the working of complimentary symmetry class B push pull amplifier. What are its merits and de-merits?
9. Explain the different types of neutralization technique used in tuning amplifier
10. Discuss the effects of cascading of amplifiers.

UNIT V(FEEDBACK AMPLIFIERS AND OSCILLATORS)

PART A

1. Mention the effects on bandwidth and output impedance due to various types of feedback.
2. Negative feedback is preferred to other methods of modifying amplifier characteristics. Why?
3. Distinguish between series and shunt feedback.
4. State the effect of feedback on noise.
5. What does shunt feedback modify?
6. What type of feedback is employed in CE stage with unbypassed emitter resistor?
7. Define positive and negative feedback?
8. What are the advantages of negative feedback?
9. State the Barkhausen's criterion for oscillation
10. List the five characteristics of an amplifier which are modified by negative feedback.
11. What is the difference between an oscillator and amplifier?
12. What is damped oscillation?
13. What is sustained oscillation?
14. What are the essential parts of an oscillator?
15. Name two high frequency oscillators.
16. What are the advantages of crystal oscillator?
17. Define: Piezo electric effect
18. Mention the types of feedback amplifiers.
19. Why L-C oscillators are not preferred to generate low frequency signals even though they have higher frequency stability compared to R-C phase shift oscillator?
20. Draw the electrical equivalent of crystal

PART B

1. Draw and describe the four types of topology for feedback of an amplifier. Derive the expression for gain with feedback. Mention the advantages of negative feedback amplifier.
2. With a neat diagram explain about Colpitt oscillator & derive the expression for frequency of oscillation and condition of oscillation.

3. With a neat diagram explain about Hartley oscillator & derive the expression for frequency of oscillation and condition of oscillation.
4. Explain the operation of crystal oscillator with neat diagram and write the expression for its frequency of oscillation.
5. A colpitt oscillator is designed with $C_1 = 100\text{pf}$ and $C_2 = 7500\text{pf}$. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 KHz and 2050 KHz.
6. With neat circuit diagram explain the operation of an RC phase shift oscillator and derive the condition for oscillation and resonant frequency with BJT.
7. Discuss the advantages of negative feedback in detail.
8. A Hartley oscillator is designed with $L_1 = 2\text{mH}$, $L_2 = 20\mu\text{H}$ and a variable capacitance. Determine the range of capacitance value if the frequency of oscillation is varied between 950 to 2050 KHz.
9. Discuss the advantages of negative feedback in detail. Voltage series negative feedback amplifier has a voltage gain without feedback of $A=500$, input resistances (R_i)= $3\text{K}\Omega$, output resistance $R_o=20\text{K}\Omega$, and feedback ratio of $\beta= 0.01$. Calculate the voltage gain A_F , input resistance (R_{if}) and output resistance (R_{of}) of amplifier with feedback.
10. A colpitt oscillator is designed with $C_1 = 100\text{pf}$ and $C_2 = 7500\text{pf}$. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 KHz and 2050 KHz.