22102721

QP CODE: 22102721

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR EXAMINATIONS, AUGUST 2022

Fourth Semester

Core Course - PH4CRT04 - SEMICONDUCTOR PHYSICS

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics,B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2020 Admission Only

C3648EED

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What is an intrinsic semiconductor?
2. What is reverse breakdown phenomenon in pn junction diode?
3. Name the diode parameters.
4. How we can calculate the efficiency of a half wave rectifier?
5. What is the use of voltage regulator?
6. What is the significance of the arrow head in the emitter of NPN and PNP transistor symbols?
7. Why CE configuration is most popular in amplifier circuits?
8. What is thermal runaway?
9. What do you mean by single stage transistor amplifier?
10. What do you meant by decibel system?
11. Explain how to obtain an voltage follower from non-inverting amplifier.
12. What is phase modulation?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Write a short note on shunt capacitor filter.

14. A 10V peak sine wave is applied to the input of a positive clipper. Draw the positive clipper circuit and the output wave form.

15. Design and draw a clamper circuit to clamp the output 5V above the zero referance level for an input signal of 4V(p).

16. Define the current gain α. For a transistor α = 0.95 and IE = 1mA, find the values of IC and IB.

17. What are the four different forms of negative feedback? Explain.

18. A silicon transistor is biased in the voltage divider method using resistors R1=39KΩ,R2=10KΩ.the other resistors used are RE=1KΩ, RC=5.6KΩ, VCC=10V, VBE =0.7V calculate IC and IC(sat).

19. A FET has a drain current of 4mA. If I_{DSS} = 6mA and V_{GS} (off) = -6V. Find the value of V_{GS} and VP.

20. Define CMRR. A differential dc amplifier has a differential mode gain of 100 and a common mode gain of 0.01. What is its CMRR in dB?

21. The maximum and minimum amplitudes of an amplitude modulated wave is 5V and 2.25 V respectively. Find its modulation index and percentage of modulation.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. What is the difference between zener diode and ordinary diode? Draw and explain the V-I characteristics of zener diode.

23. Why negative feedback is employed in amplifiers? Explain this with the help of different advantages of negative feedback.

24. Explain Colpitt's oscillator with suitable diagram. Compare it with Hartley oscillator.

25. Draw and derive the output voltage of a three input non-inverting summing amplifier. With Rf= 10K Ohm design an op-amp non-inverting summing amplifier with output voltage Vo = Va+Vb+Vc.

(2×10=20)

23123528

QP CODE: 23123528

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR EXAMINATIONS, MAY 2023

Fourth Semester

Core Course - PH4CRT04 - SEMICONDUCTOR PHYSICS

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2021 Admission Only

D37B1F6B

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. How is depletion layer formed?
2. What happens when the diode is reverse biased?
3. How a zener diode differ from pn junction diode?
4. Which is having more efficiency, half wave, full wave or center tap rectifier? Why?
5. Name the four filter circuits.
6. What is the significance of the arrow head in the emitter of NPN and PNP transistor symbols?
7. Explain what is meant by I_{CEO}?
8. Draw the block diagram of current-series feedback.
9. What are the consequences of no or faulty biasing of transistor?
10. Write any two differences between Hartley and colpitt's oscillator.
11. What is the value of open loop gain of an ideal op-amp?
12. Explain the function of diode as detector.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. A silicon diode dissipates 4W for a forward dc current of 2A. Calculate the voltage drop across the diode and its bulk resistence.

14. With the help of a circuit diagram explain voltage tripler.

15. Design and draw a clamper circuit to clamp the output 5V above the zero referance level for an input signal of 4V(p).

16. With the help of a connection diagram draw and explain the input characteristic of a common- emitter configuration of a transistor.

17. For a transistor β = 45 and voltage drop across 1KΩ load which is connected in the collector circuit is 1V. Find the base current for common emitter connection.

18. With a neat diagram explain the variations in amplifier gain with frequency.

19. For an N channel JFET I_{DSS} = 8.7mA; VP = -3V; V_{GS} = -1V. Find the values of (i) I_D (ii) gmo (iii) gm.

20. Find the voltage gain and output voltage of a non- inverting amplifier with Rf = 56K, R1 = 1K and input voltage = 1V(P-P) a.c. signal. Given supply voltage = ±12V. Comment on the result.

21. A carrier wave of 900W is subjected to 100% amplitude modulation. Calculate the power carried by the sidebands.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Explain the positive, negative and biased clipper with appropriate circuit diagram.

23. What is negative feedback? Derive the equation for the gain of the amplifier with negative feedback. What are the advantages of negative feedback?

24. Describe a phase shift oscillator. How is positive feedback realized in it?

25. Explain amplitude modulation. Derive an expression for the instantaneous amplitude of an amplitude modulated wave. Explain the side band frequencies and band width.

(2×10=20)

QP CODE: 19101371

19101371

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, MAY 2019

Fourth Semester

Core Course - PH4CRT04 - SEMICONDUCTOR PHYSICS

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics,B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2017 Admission onwards

CB171B41

Maximum Marks: 60 **Time: 3 Hours**

Part A

Answer any **ten** questions.

Each question carries **1** mark.

1. What is N type extrinsic semiconductor?
2. Explain Diffusion Capacitance of a PN junction.
3. What is the difference between ideal diode and real diode?
4. What is the zener voltage?
5. How does a clamper circuit affect the peak and average values of the waveform?
6. Compare the output resistances of CB and CE configurations, giving typical values.
7. What is the range of values of the current gain α.
8. What is leakage current in BJT? What is the effect of temperature on its leakage current?
9. What are the three operating regions of a bipolar transistor?
10. What are the factors affecting bias variations?
11. Why the op-amp input terminals are designed by (+) and (-) inputs?
12. What is a modulating signal?

(10×1=10)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. A crystal diode having internal resistance r = 30 Ω is used for half wave rectification. If the applied voltage v = 24 Sin wt and load resistance RL = 400 Ω, find (1)Idc, Im, Irms (ii) dc power output and ac power input (iii) dc output voltage (iv) efficiency of rectification
14. For a zener shunt regulator if Vz= 20 V, R=2KΩ, RL= 4KΩ and the input voltage varies from 44 to 80 V, find the maximum and minimum values of zener current
15. Sketch the output waveform across a negatively biased clipper having a battery of 2V when a sinusoidal wave of 10 V (pp) is applied to the circuit (Assume the diode to be ideal).

16. Draw the symbols of NPN and PNP transistors. What are the functions of emitter, base and collector. Explain the doping levels of emitter, base and collector.

17. Find the frequency of a Hartley oscillator which uses a tank circuit with inductance coils of 10mH and 8mH. The capacitance of the capacitor is 470pF.

18. A phase shift oscillator is designed to have a frequency 1000Hz. If it uses equal resistors R=4.7KΩ, calculate the capacity of the capacitors required for sustained sinusoidal oscillations.

19. A JFET has parameters of V_{GS} (off) equal to -20V and I_{DSS} equal to 12mA. Plot the Transconductance curve for the device using V_{GS} values of 0V,-5V,-10V,-15V and -20V.

20. Find the voltage gain and output voltage of an inverting amplifier with Rf = 47K, R1 = 1K and input voltage = 1V. Given supply voltage = ±12V. Comment on the result.

21. A carrier wave of 80V-2000KHz signal is modulated by a 10V-1000Hz sinusoidal audio signal. Calculate its modulation index, lower and upper side frequencies and band width.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **10** marks.

22. What are voltage multipliers? With circuit diagram, explain the function of doubler and trippler.

23. What is negative feedback? Derive the equation for the gain of the amplifier with negative feedback. What are the advantages of negative feedback?

24. Explain performance of a CE amplifier with neat diagram and explain the phase reversal.

25. Draw and derive the output voltage of a four input inverting summing amplifier. Modify the resistor values and make it an averaging amplifier.

(2×10=20)

QP CODE: 20100831

20100831

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, MARCH 2020

Fourth Semester

Core Course - PH4CRT04 - SEMICONDUCTOR PHYSICS

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics,B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2017 Admission onwards

5CD0B75E

Time: 3 Hours

Marks: 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. How extrinsic semiconductors are formed?
2. Explain Transition Capacitance of a PN junction.
3. Why zener diode connect in reverse biased condition?
4. Find the ripple factor of a series inductor filter.
5. What is a voltage doubler?
6. Compare the doping levels of emitter, base and emitter.
7. Write down the maximum limit of current gain α.
8. What happens to input and output resistances of a transistor when a negative voltage-series feedback is employed?
9. Define amplification.
10. State the Barkhausen criterion for an oscillator
11. What is a P-channel JFET?
12. A carrier wave of peak value 6V is amplitude modulated by a signal of amplitude 3V. Find the modulation index.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. A silicon diode with knee voltage 0.7 V is used in a half wave rectifier circuit with an ac source of 20 V and 60 Hz and a load of 1 KΩ. What is the peak value of source voltage applied to the diode? Calculate the peak load voltage and dc load voltage when you consider the diode as (a) ideal and (b) real. Draw the output wave form in both cases as you observe in an oscilloscope.

14. Design and draw a clipper circuit to clip the output at +2V.

15. Design and draw a clamper circuit to clamp the output 5V below the zero referance level for an input sine wave of 4V(p).

16. An RC coupled amplifier has a mid frequency gain of 200 and a frequency response from 100Hz to 20KHz. A negative feedback network with $\beta = 0.02$ is incorporated into the amplifier circuit. Determine the new system performance.

17. A silicon transistor is biased in the voltage divider method using resistors R1=14KΩ, R2=6KΩ.the other resistors used are RE=6KΩ, RC=2KΩ, VCC = 20V. Neglect VBE and take β=50. Calculate IC and IC(sat).

18. The voltage gain of an amplifier is 72. Find its gain in decibel.

19. Define CMRR. For a given op-amp CMRR = 10^4 and differential gain Ad = 10^5. What is the common mode gain?

20. Find the voltage gain and output voltage of a non- inverting amplifier with Rf = 10K, R1 = 1K and input voltage = +1V.

21. A 1MHz carrier wave is frequency modulated by a 2 KHz audio signal with a frequency deviation of 20 KHz. Calculate its modulation index and percentage of modulation.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. What are diode parameters? Explain. Brifly explain how to test a diode. What is an ideal diode?

23. Draw the circuit diagram of CB configuration of a transistor. Draw and explain the input and output characteristics.

24. Describe a phase shift oscillator. How is positive feedback realized in it?

25. What is an amplitude modulated wave? What is the modulation index and band width of AM signals? Explain the power distribution among the carrier frequency and side bands.

(2×10=20)

21102811

QP CODE: 21102811

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATIONS, OCTOBER 2021

Fourth Semester

Core Course - PH4CRT04 - SEMICONDUCTOR PHYSICS

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics,B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2019 Admission only

408ACBFC

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What is the difference between intrinsic and extrinsic semiconductors?
2. What is avalanche breakdown?
3. Explain the term 'PIV'.
4. How a zener diode differ from pn junction diode?
5. What are the different types of clipper?
6. Why emitter is heavily doped than collector and base?
7. What do you mean by d.c. and a.c. load line?
8. What do you mean by positive feedback?
9. State the important conditions to be satisfied for the normal transistor operation.
10. Write down the expression for power gain in bel and decibel.
11. Give the classification of pulse modulation.
12. What will be the percentage of modulation if the signal amplitude is half the carrier amplitude?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Write a short note on Pi filter.

14. With the help of a circuit diagram explain voltage tripler .

15. Design and draw a clamper circuit to clamp the output 2V above the zero referance level.

16. With the help of a connection diagram draw and explain the output characteristic of a common- base configuration of a transistor.

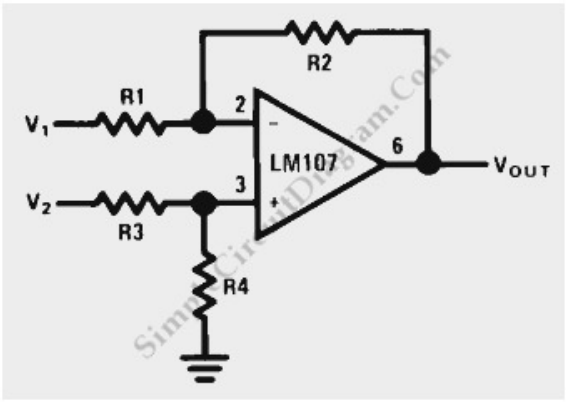
17. In a CB connection α = 0.95. The voltage drop across 2KΩ load resistance which is connected in the collector is 2V. Find the base current.

18. Explain what is leakage current? The following measurements are made in a transistor IC = 5.202mA, IB = 50μA, I_{CO} = 2μA. Compute the values of α, β and IE.

19. When a reverse voltage of 10V is applied between gate and source of JFET the gate current is 10μA. Determine resistance between gate and source.

20. Find the voltage gain and output voltage of an inverting amplifier with Rf = 10K, R1 = 1K and input voltage = 1V. Given supply voltage = ±12V.

21. Find the output voltage of the summing amplifier. Given R1 = 2K, R2 = 1K,R3 = 4K, R4 = 4K, V1 = 0.4V and V2 = 0.6V.



(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Explain the half wave rectifier with a neat circuit diagram. Derive an expression for the efficiency, ripple factor and PIV rating and compare it with full wave rectifier. What are the disadvantages?

23. What do you meant by single stage transistor amplifier? Discuss the working of a CE

amplifier with neat diagram and explain the various amplification factors.

24. Explain Hartley oscillator with suitable diagram. Compare it with Colpitt's oscillator.

25. Obtain the expression for varying voltage of an amplitude modulated wave and the total power of the AM wave. Discuss the waveform and side bands in it.

(2×10=20)