B.Sc DEGREE (CBCS) IMPROVEMENT / REAPPEARANCE EXAMINATIONS, MARCH 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)

2017 Admission Onwards

668D3475

Time: 3 Hours   Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. How the variation in temperature affect the barrier voltage?

2. What is zener breakdown?

3. What is the benefit of a filter circuit?

4. What is clipper?

5. What is the difference between a positive clamping circuit and a negative clamping circuit?

6. Explain why an ordinary junction transistor is called bipolar?

7. What are the factors affecting bias variations?

8. What do you mean by single stage transistor amplifier?

9. Write down the expression for power gain in bel and decibel.

10. Write down the advantages, disadvantages of colpitt's oscillator.

11. Define Channel of a FET.

12. Explain the effects of an AM, whose percentage modulation is greater than 100%.

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Draw and explain the V-I characteristics of a P-N junction diode.

14. 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

15. A 10V zener diode is used to regulate the voltage across a variable load resistor. The input voltage varies between 12 to 18 V. The load current (IL) varies between 5 to 100 mA. The minimum zener currrent is 20 mA. Find (i) the maximum value of series resistance (R) and (ii) the maximum power dissipated by the zener diode using this value of series resistance.

16. Define α, β and γ of a transistor. Derive the relation between them.

17. A germanium transistor has I_{CBO} = 10μA, α = 0.98 and IC = 1mA. Determine the emitter current and β of the transistor.

18. In a negative feedback amplifier A = 100, β = 0.04 and Vi = 50V. Find (i) gain with feedback (ii) output voltage (iii) feedback factor and (iv) feedback voltage.

19. What are the characteristics of an ideal op-amp?

20. Find the voltage gain and output voltage of a non- inverting amplifier with Rf = 68K, R1 = 1K and input voltage = 1V. Given supply voltage = ±15V. Comment on the result.

21. A 1 MHz carrier is modulated with 900 Hz audio signals. What are the frequencies of first pair of sidebands?

(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 CE configuration of a transistor. Draw and explain the input and output characteristics.

24. Draw and explain RC phase shift oscillator?

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)