QP CODE: 25019361

25019361

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS)) REGULAR/ IMPROVEMENT/ REAPPEARANCE / MERCY CHANCE EXAMINATIONS, FEBRUARY 2025

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

61275E2E

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. What are the different types of extrinsic semiconductors?
2. What is reverse breakdown phenomenon in pn junction diode?
3. Give the relation between dynamic resistance and junction resistance.
4. What is zener breakdown?
5. Name the four filter circuits.
6. Why the emitter-base junction of a transistor is always forward biased?
7. Why Silicon transistors are more often used than Germanium?
8. How will you construct d.c. load line from output characteristic of a transistor?
9. What type of feedback is employed in amplifiers? Explain.
10. Draw the block diagram of voltage-shunt feedback.
11. Draw the pin configuration of IC 741 op-amp.
12. What is the necessity of demodulation?

(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. 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).

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

16. A transistor is connected in CE configuration in which collector supply is 8V and the voltage drop across resistance RC connected in the collector circuit is 0.5V. The value of RC = 800Ω. If α = 0.96 determine (i) collector emitter voltage and (ii) base current.

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. A Hartley oscillator uses inductance coils of inductance 0.3mH each. If the capacitance of the capacitor used is 220pF, calculate the frequency of the oscillator.

19. Sketch the formation of depletion region in JFET.

20. The resting frequency of a FM signal is 200 MHz and its maximum frequency is 200.05 MHz. Calculate its i) frequency deviation ii) carrier swing iii) modulation index and iv) percentage modulation if the maximum modulating frequency is 2KHz.

21. For an amplitude modulated wave, the maximum amplitude is found to be 15V while the minimum amplitude is found to be 5V. Determine the modulation index. What would be the value of modulation index if the minimum amplitude is zero volt?

(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 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. What do you mean by decibel system? Explain how voltage gain, power gain and current gain expressed in dB. State its merits. What is the significance of -3dB gain.

25. With neat diagram derive the voltage gain of an inverting amplifier. Also explain the significance of negative sign in the equation.

(2×10=20)