QP CODE: 19101371

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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)