B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2024
SEMESTER 4 - PHYSCIS
COURSE : **19U4CRPHY04 - SEMICONDUCTOR PHYSICS**
(For Regular - 2022 Admission and Improvement / Supplementary - 2021/2020/2019 Admissions)

Time : Three Hours   Max. Marks: 60

PART A
Answer any 8 (2 marks each)

1. Draw the symbol of npn and pnp transistor and specify the leads.
2. A FET is a voltage controlled device. Why?
3. A transistor amplifier employes a 4kΩ as collector load. If the input resistance is 1kΩ, determine the voltage gain. Given β = 100, gm = 10mA/volt and signal voltage = 50mV.
4. It is required to clamp an input signal at a definite dc voltage level. Explain with the aid of a circuit.
5. What is a transistor?Why is it so called?
6. Distinguish between positive and negative clampers.
7. Mention the essentials of biasing circuits.
8. A transistor amplifier has a dc collector current of 5mA. What is the ac resistence of the base if ß = 200?
9. Define zener voltage.
10. Analyse whether an operational amplifier is a linear or nonlinear device.

(2 x 8 = 16)

PART B
Answer any 6 (4 marks each)

11. A bandwidth of 15 MHz is available for AM transmission. If the maximum audio frequency of the modulating signal is not to exceed 15 kHz, then analyze, how many stations can be broadcast without interference in the available band?
12. Illustrate the schematic of a RC phase shift oscillator with a pulse width of 20 micro seconds.
13. Write short notes on the following: (i)phase reversal (ii)d.c. and a.c. load lines (iii)operating points (iv)classification of amplifiers.
14. The voltage gain of a negative feedback amplifier without feedback is 150 and feedback ratio is 0.04. If its input ac voltage without feedback is 10 mV, calculate (1) its feedback factor (2) voltage gain with feedback (3) output voltage with feedback and (4) feedback voltage.
15. A, zener is rated as follows. Vz = 6.2 V; rz = 2Ω; Iz = 50 mA; Iz (min) = 5mA and Iz(max) = 100 mA. Calculate the voltage drop across the diode when the load current varies from 10mA to 80mA. Hence calculate the percentage of regulation.
16. Illustrate a phase shifting ciruit, suitable for 1 kHz square wave.
17. A 6.8V zener is used to regulate the voltage across a variable load resistor. The input voltage varies between 10V and 14V.When a minimum current passes through the series resistor R, a minimum current of 5mA passes through the diode and a maximum current of 50mA passes through the load. Calculate the value of the series resistor used.
18. Elicit the needs for stabilisation of a transistor circiut.

(4 x 6 = 24)

PART C
Answer any 2 (10 marks each)

19. Explain with a neat circuit diagram the working of a RC phase shift oscillator.

20. Design an experiment to detremine the input and output chareteristics of CC configured pnp tansistor. Draw the charecteristic curves and find the input and output resistance

21. What is a zener diode? Define zener voltage. With the aid of a neat circuit diagram explain how it can be used as a voltage regulator.

22. Explain with a neat circuit diagram the working of an operational amplifier based inverting and noninverting amplifiers.

(10 x 2 = 20)