Reg. No ..... Name **23U428**

B. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023

SEMESTER 4 : PHYSCIS

COURSE : **19U4CRPHY04 : SEMICONDUCTOR PHYSICS**

(For Regular - 2021 Admission and Improvement / Supplementary - 2020 / 2019 Admissions)

Time : Three Hours Max. Marks: 60

PART A

Answer any 8 (2 marks each)

1. What is a PN junction? How does a potential barrier form within a crystal?
2. Write short note on operating point & d.c. load line.
3. Explain the operation of transistor as an amplifier.
4. What is the advantage of SSB-SC in AM transmission?
5. In a transistor if Ic = 4.9mA and I_E = 5mA, what is the value of α.
6. Differentiate an amplitude modulated and a frequency modulated wave graphically.
7. It is required to clamp an input signal at a definite dc voltage level. Explain with the aid of a circuit.
8. Explore, the possibility to construct a tunable monostable multivibrator.
9. How will you get undamped oscillations from a tank circuit?
10. What are the advantages of a full wave bridge rectifier over a centre tap full wave rectifier?

(2 x 8 = 16)

PART B

Answer any 6 (4 marks each)

11. Discover a operational amplifier based circuit which gives the average of two voltages.
12. The tuned circuit of an oscillator in an AM transmitter uses 40 micro henry coil and a 1 nano farad capacitor. If the carrier wave is modulated by audio frequency upto 15 kHz, analyse the frequency band occupied by the side bands and channel width.
13. Calculate the closed loop voltage gain of a negative feedback amplifier having open loop gain A = 300 and feedback factor 0.05.
14. With a neat diagram, explain the action of Colpitt's oscillators.
15. Illustrate the schematic of a RC phase shift oscillator with a pulse width of 10 micro second.
16. A voltage-divider biased amplifier has the values of R1 = 40kΩ R2 = 10kΩ, RC = 6kΩ; RE = 2kΩ, VCC = +10V and β = 80. Determine the a.c. emitter resistance of the transistor.
17. A PN junction germanium diode has a reverse saturation current of 1μA. Calculate the diode current for a forward bias voltage of 0.2V at room temperature of 27°C. Take η=1.
18. 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.

(4 x 6 = 24)

PART C
Answer any 2 (10 marks each)

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

20. What is modulation? Explain with diagrams the working of (i) an amplitude modulation transmitter and (ii) an amplitude modulated signal reciever. Also discuss, various AM schemes.

21. What is a PN junction diode? Explain its behaviour when it is forward biased and reverse biased. Draw and explain its V-I characteristics.

22. Explain with examples the functioning of LC oscillators and RC oscillators.

(10 x 2 = 20)