QP CODE: 20100831

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Reg No : .....

Name : .....

# B.Sc DEGREE (CBCS) EXAMINATION, MARCH 2020

## 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

5CD0B75E

Time: 3 Hours

Marks: 60

### Part A

*Answer any **ten** questions.*

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

1. How extrinsic semiconductors are formed?
2. Explain Transition Capacitance of a PN junction.
3. Why zener diode connect in reverse biased condition?
4. Find the ripple factor of a series inductor filter.
5. What is a voltage doubler?
6. Compare the doping levels of emitter, base and emitter.
7. Write down the maximum limit of current gain α.
8. What happens to input and output resistances of a transistor when a negative voltage-series feedback is employed?
9. Define amplification.
10. State the Barkhausen criterion for an oscillator
11. What is a P-channel JFET?
12. A carrier wave of peak value 6V is amplitude modulated by a signal of amplitude 3V. Find the modulation index.

(10×1=10)

## Part B

*Answer any **six** questions.*

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

13. A silicon diode with knee voltage 0.7 V is used in a half wave rectifier circuit with an ac source of 20 V and 60 Hz and a load of 1 KΩ. What is the peak value of source voltage applied to the diode? Calculate the peak load voltage and dc load voltage when you consider the diode as (a) ideal and (b) real. Draw the output wave form in both cases as you observe in an oscilloscope.

14. Design and draw a clipper circuit to clip the output at +2V.

15. Design and draw a clamper circuit to clamp the output 5V below the zero referance level for an input sine wave of 4V(p).

16. An RC coupled amplifier has a mid frequency gain of 200 and a frequency response from 100Hz to 20KHz. A negative feedback network with $\beta = 0.02$ is incorporated into the amplifier circuit. Determine the new system performance.

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. The voltage gain of an amplifier is 72. Find its gain in decibel.

19. Define CMRR. For a given op-amp CMRR = $10^4$ and differential gain Ad = $10^5$. What is the common mode gain?

20. Find the voltage gain and output voltage of a non- inverting amplifier with Rf = 10K, R1 = 1K and input voltage = +1V.

21. A 1MHz carrier wave is frequency modulated by a 2 KHz audio signal with a frequency deviation of 20 KHz. Calculate its modulation index and percentage of modulation.

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

24. Describe a phase shift oscillator. How is positive feedback realized in it?

25. What is an amplitude modulated wave? What is the modulation index and band width of AM signals? Explain the power distribution among the carrier frequency and side bands.

(2×10=20)