UNIT - V

9. a) Discuss two advantage of FM over AM wave. 2

b) Derive the expression for the spectrum of FM wave. Explain the Band width of a FM wave. 3+1

c) Explain the principle of (i) PCM (ii) PAM. 2+2

d) Deduce the expression of the noise voltage develop across a resistor. 4

10. a) Write down the names of different light sources and light detectors used in a fibre optic communication system. 2

b) Discuss the structure of an optic fibre? What are its advantages over the metallic wires and cables. 2+2

c) Deduce the expression for the Numerical Aperature (NA) for a step index fibre. 4

d) What do you understand by delay, transponders, multiple spot beam and earth system with reference to satellite communication systems. 4

PG (CBCS) ODD SEMESTER EXAMINATION, 2021
Held in July 2022

PHYSICS
1st Semester

Course No. : PHYCC - 104
(Electronics)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions, taking one question from each unit)

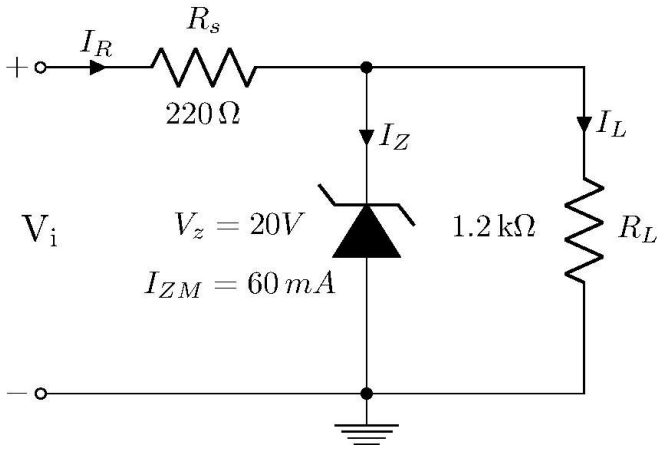
UNIT - I

1. a) What are diffusion and drift currents for a pn junction diode? Explain depletion region. 2+2

b) Why Si is preferred to make semiconductor devices compared to Ge? 2

c) Explain from the output characteristics of a transistor, how a transistor can be used as a switch. 4

d) Determine the range of values of V_i that will maintain the Zener diode in "ON" state. 4



2. a) Define I_{CBO} and I_{CEO}. How are they related? 2+2

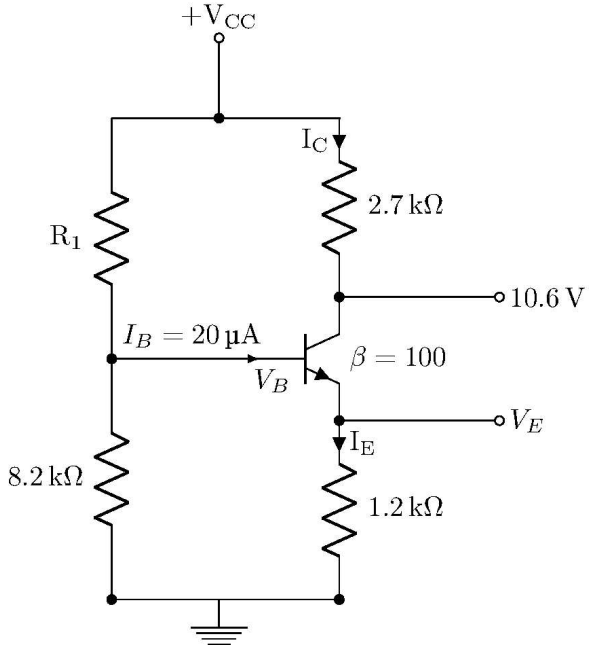
b) Given the information appearing in the figure determine.

a) I_C

b) V_E

c) V_{CC}

d) V_{CE}



b) Obtain the expression for the input and output off-set voltage of an op-amp. 2+2

c) Discuss active band pass filter using op-amps. 4

d) Define CMRR. (Common-mode Rejection Ratio). 2

UNIT - IV

7. a) Using Ex-NOR gate, how we can compare two binary words? Explain with a circuit diagram. 2

b) Explain with cercuit diagram the truth table of half and full-substractor. 4

c) Using K-map reduce the following expression. 6

$F = \Sigma (m_0, m_2, m_8, m_9, m_{10}, m_{11}, m_{12}, m_{13}, m_{14}, m_{15})$

d) Why AND gate is called enable gate. 2

8. a) Discuss with truth table the working of a clocked JK F/F. 5

b) Discuss with basic logic gate the working of 4:1 multiplexer (MUX). 5

c) Explain 3 bit A/D converter with a neat diagram. 4

c) Discuss the construction and working principle of a n-channel JFGT. Draw its output and transfer characteristics. 4+2

UNIT - II

3. a) Discuss four different types of feedback connection. 4

b) Explain how the bandwidth of an amplifier increases with negative feedback. 4

c) Explain the principle of operation of a phase shift oscillator and find the expression for frequency of oscillation. 6

4. a) What is an oscillator? What are various types of oscillators? 2+2

b) State and explain Barkhausen criterion for sustained oscillations. 2

c) Write short note on (any two) 4x2=8

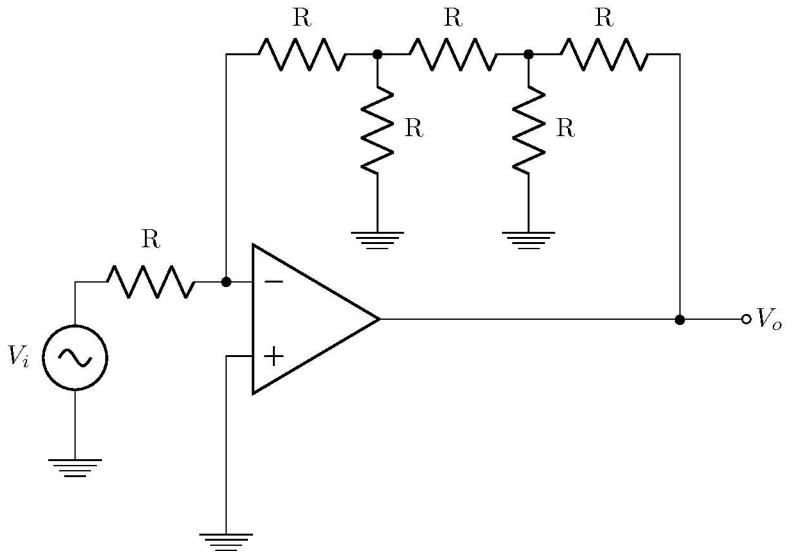
i) Solar cell

ii) Photo diode

iii) Gunn diode

UNIT - III

5. a) Find the gain V_0/V_i of the curcuit. 4



b) Discuss slew-rate and power bandwidth of an op-amp. 4

c) Explain the concept of virtual short, when op-amp is used as non-inverting amplifier. 2

d) Discuss how op-amp can be used as logarithmic and anti-logarithmic amplifier. 2+2

6. a) Discuss how op-amp can be used as voltage comparator. 4