University of Sargodha

BS 1st Term Examination 2023

Subject: CS/IT **Paper: Applied Physics/Basic Electronics (PHYS-101/PHY-2210)**

Time Allowed: 02:30 Hours **Maximum Marks: 60**

Note: Objective part is compulsory. Attempt any four questions from subjective part.

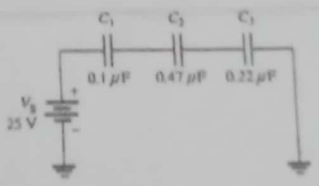
Objective Part (Compulsory)

Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (2*12)

i. What is analog modulation and state various techniques?
ii. Give the advantages of PIN photodiodes.
iii. How the op-amp comparator should be chosen to get higher speed of operation?
iv. In an NPN silicon transistor, α=0.995, I_E=10mA and leakage current I_{CBO}=0.5μA. Determine I_{CEO}
v. What does I_{CEO}, the subscript 'CEO' means?
vi. In a BJT, the collector current is 12 mA and the emitter current is 1.02 times the collector current. Find the base current.
vii. Define the different operating regions of transistor.
viii. What is meant by diffusion capacitance?
ix. Derive the ripple factor of full wave rectifier.
x. What is meant by drift current?
xi. Define magnetic reluctance.
xii. Two capacitors of capacitance $C_1 = 6\ \mu F$ and $C_2 = 3\ \mu F$ are connected in series across a cell of emf 18 V. Calculate the charge on each capacitor.

Subjective Part (4*9)

Q.2. a) What is difference between active and passive components? Give some examples of these components.
b) State three quantities which are used to establish Ohm's law for magnetic circuits.
c) Find the voltage across each capacitor.



Q.3. a) What is meant by isolated atom, draw the energy levels of an isolated atom.
b) Differentiate solid by using energy band diagram.
c) A silicon diode has a forward voltage drop of 1.2 V for a forward dc current of 100 mA. It has a reverse current of 1μA for the reverse voltage of 10 V. calculate. Bulk and reverse resistance of the diode.

Q.4. a) What are different types of power supply. Draw block diagram of dc power supply.
b) What is rectifier? Discuss the working of center tapped transformer full wave rectifier and calculate its average value.
c) For a silicon diode, the reverse saturation current at room temperature (T = 300 K) is found to be 100 nA. What should be diode current when the applied voltage is (a) 0.2 V (b) 0.8 V?

Q.5. a) What is voltage multiplier? Discuss the working of half-wave voltage doubler.
b) Draw transistor circuit configuration and determine the relation between α and β.
c) An AC supply of 230 V is applied to a half-wave rectifier circuit through a transformer of turn ratio 10:1. Find (i) the output d.c. voltage and (ii) the peak inverse voltage. Assume the diode to be ideal.

Q.6. a) What is meant by leakage current in a transistor? How these can be classified. Show that $I_C = \beta I_B + (\beta + 1)I_{CBO}$.
b) What is difference between intrinsic and extrinsic semiconductor? How extrinsic semiconductors are fabricated.
c) What is difference between real and ideal diode?

Q.7. a) What is difference between Modulation and De-modulation? State different types of modulation.
b) An audio signal given by $15\sin 2\pi(2000)t$ amplitude-modulates a sinusoidal sine wave $60\sin 2\pi(100{,}000)$ determine modulation index, percent modulation, frequencies of signal and carrier, channel width.
c) What is solar cell? Discuss the working of solar cell.