University of Sargodha

BS 1st Semester/Term Exam 2021

Subject: I.T/ C.S **Paper: Applied Physics/Basic Electronics (PHYS -101 / PHY-2210)**

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

Note: **i) Objective part is compulsory. Attempt any three questions from subjective part.**
ii) The marks of the students, who are repeating the course, will be converted according to 80 marks (for non-practical courses)/60 marks (for practical courses).

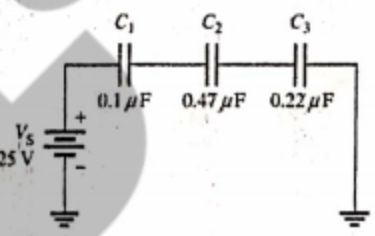
Objective Part (Compulsory)

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

i. Give the advantages of PIN photodiodes.
ii. How the op-amp comparator should be chosen to get higher speed of operation?
iii. In an NPN silicon transistor, α=0.995, I_E=10mA and leakage current I_{CBO}=0.5μA. Determine I_{CEO}
iv. In a BJT, the collector current is 12 mA and the emitter current is 1.02 times the collector current. Find the base current.
v. Define the different operating regions of transistor.
vi. What is meant by drift current?
vii. Define magnetic reluctance.
viii. What is difference between Zener Breakdown and Avalanche Breakdown.
ix. A Silicon diode passes a current of 100 mA at 1V. Find the bulk resistance.
x. For the common-emitter transistor $\beta = 100$ and I_B= 50μA. compute the value of I_C and I_E.
xi. What are transducers?
xii. How the op-amp comparator should be chosen to get higher speed of operation?

Subjective Part (3*12)

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 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.5. 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.6. 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 $60\sin 2\pi(100{,}000)t$. determine modulation index, percent modulation, frequencies of signal and carrier , channel width.
c). What is solar cell? Discuss the working of solar cell.