22-3-17

DOON UNIVERSITY, DEHRADUN
Mid-Semester Examination, Fourth Semester, 2016-17
School of Physical Sciences
Core test paper of 5 Year (Integrated) MSc Program
Course: PHC-253: Analog Systems and Applications

Time Allowed: 2Hours   *Maximum Marks: 30*

Note: Attempt All Questions from Sections A, B, C.

SECTION: A

(Marks: 10)

1. The alternating voltage applied to FWR is 25sin100IIt. Assuming diode to be ideal, calculate the dc current through a load of 100Ω.
2. What is diffusion current? Give examples of LED materials.
3. Calculate the barrier potential for Si junction at (a) $100°C$ (b) $0°C$
4. Write the characteristics of an ideal op amp.
5. Define: (a) PIV of half wave rectifier (b) knee voltage (c) avalanche breakdown (d) reverse saturation current

SECTION: B   *(Marks: 10)*

6. (a) Does a full wave rectifier better than half wave rectifier? Explain.
   (b) Obtain expression for rectification efficiency of centre tapped rectifier.
7. A Zener regulator has an input voltage in the range 20V and a load current in the range of 20mA. If the Zener voltage is 6.8V, calculate the value of series resistor. Draw the circuit diagram for the same.
8. $v_1=0.42$ mV and $v_2=0.44$ mV, A_{0i} is 10^5 and CMRR is 80 dB. Determine output voltage.
9. (i) What happens when positive voltage is applied to p-side of p-n junction? Explain.
   (ii) Why band bending occurs in a p-n junction?

SECTION: C   *(Marks: 10)*

10. (a) What do you understand by mobility of charge carriers in a semiconductor?
    (b) A n-type Si rod of length 0.7 cm has a cross-sectional area of 0.1 cm^2. A DC bias, voltage of 35V across on the rod results in a 5.6-amp DC current. Under this bias, an electric pulse applied at one end takes $10\mu s$ to traverse the length of the Si rod. Determine the carrier concentration.
    (c) Differentiate between a solar cell and photo diode.

11. (a) Explain the virtual ground in an op amp circuit.
    (b) Discuss op amp as integrator OR differentiator circuit.