DOON UNIVERSITY, DEHRADUN
Mid Semester Examination, Fourth Semester, 2017-18
Department of Physics, 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. Why common emitter configuration is most popular in amplifier circuits?
2. How the doping of an intrinsic semiconductor is performed in order to increase the concentration of free electrons as charge carriers? Give examples.
3. If a light of certain wavelength falls on a material with bandgap of 2.5 eV, calculate the wavelength of that light. In which regime of visible region, the particular wavelength falls?
4. Define: (a) knee voltage (b) quiescent point (c) ripple factor (d) negative temperature coefficient of resistance
5. What do you understand by the mobility of charge carriers in a semiconductor? On what factors does it depend?

SECTION: B   *(Marks: 10)*

6. If you are provided a diode, how would you reverse bias it? What happens to the depletion layer of reverse biased p-n junction diode? Explain.
7. Why a Zener diode is used as a voltage regulator?
8. Why band bending occurs in a p-n junction? How would you represent the correct energy band diagram of a p-n junction diode in equilibrium?
9. The load resistance of $5K\Omega$ is in full wave rectifier circuit. Voltage applied to each diode is 220 sin 50 t. Each diode has a resistance 100 Ω. Find (i) maximum value of current (b) rms value of current (c) ripple factor.

SECTION:C   *(Marks: 10)*

10. (a) The current gain of a transistor in a common emitter is 49. Calculate its common base current gain. Find the base current, when the emitter current is 3 mA.
    (b) What do you understand by the output characteristics of a common emitter transistor? Explain in detail. Draw the characteristics considering the load line for no signal collector current.
11. What do you understand by efficiency of a full wave rectifier with proper illustrations and explanation? Prove that rectification efficiency of a centre tapped full wave rectifier is 81.2%.