Course Name: ELECTRONIC DEVICES (BECT 304)

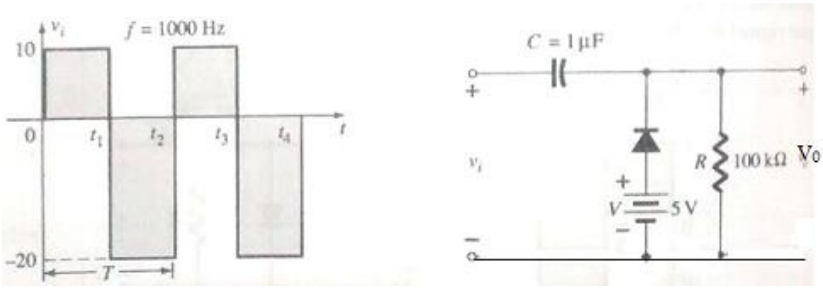
Course Outcomes:

At the end of this course students will demonstrate the ability to:

1. Understand the principles of semiconductor Physics.
2. Understand and utilize the mathematical models of semiconductor junctions.
3. Understand carrier transport in semiconductors.
4. Utilize the mathematical models of MOS transistors for circuits and systems.
5. Analyze and find application of special purpose diodes.

MODEL QUESTION PAPER

S.No.	Questions	Marks	CO	BL
1a	Determine the conductivity and resistivity of an intrinsic sample of Si at normal room temperature at 300k.Given μ_n = 1350cm 2 /V-sec, μ_p = 480cm 2 /V-sec, n i = 1.52* 10 10 /cm 3 at 300k	8	3	3
1b	Differentiate between intrinsic and extrinsic semiconductor. Give example	6	1	4
1c	What is meant by point defects in a crystals lattice? What are different types of point defects? How are they caused?	6	1	2
2a	Explain why the energy levels of an atom become energy bands in a solid. Classify the following as conductor, insulator, and semiconductor with reasons: Gallium, Germanium and Carbon	10	1	6
2b	What is hall effect in semiconductor? What properties of semiconductor are determined from hall effect experiment	10	1	1
3a	What is an ideal diode? Draw the VI characteristics of an ideal diode.	6	2	1
3b	Explain the phenomenon of the formation of depletion layer in the p-n junction. What will the effect on it under different biased condition.	6	2	2
3c	What do you understand by drift current and diffusion current? Write an equation for the net electron current in semiconductor	8	3	2
4a	Derive the equation of continuity for N type semiconductor. State in words (no mathematics) what each of the terms on the left hand side and right hand side represents physically.	10	3	4
4b	State mass action law? A specimen of silicon at 300K for which the density of carriers is $5*10^{22}$/ cm^3, is doped with impurity atoms such that there is one impurity atom for $5*10^7$ silicon atoms. All the	10	3	5

	impurity atoms may be assumed ionized. Given that the intrinsic concentration(ni) = $1.5*10^{10}$/ cm^3, mobility of electrons = $1300cm^2$/ V-s, mobility of holes = $500cm^2$/ V-s. calculate the conductivity of intrinsic and doped silicon.			
5a	What do you mean by breakdown? Differentiate between avalanche and zener breakdown.	**6**	**2**	**4**
5b	Which is the hot carrier diode? Describe its special advantages and disadvantages. Draw its symbol and I-V characteristics.	**8**	**5**	**2**
5c	Determine V_0 for the network shown in figure for given input. 	**6**	**2**	**3**
6a	Draw and explain the characterization of a tunnel diode and its symbol. What is tunnelling? Explain	**10**	**5**	**3**
6b	Draw a center tapped FWR and bridge type FWR diagrams and explain their operation. Why is bridge type preferred?	**10**	**2**	**3**
7a	Differentiate between JFET and BJT.	**6**	**4**	**4**
7b	How does early effect affect the BJT characteristics in CB configuration?	**6**	**4**	**4**
7c	Draw the Ebers – Moll model for P-N-P transistor and explain.	**8**	**4**	**3**
8a	Draw the structure of depletion mode MOSFET . Show the formation of channel in these two modes	**10**	**4**	**3**
8b	Draw a Self bias circuit.Explain the stabilization action of self bias. In a fixed biasing circuit Rb=1MΩ and Rc=5KΩ, Vcc=6V, β =100.Determine the Q point.	**10**	**4**	**5**

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analysing, 5- Evaluating, 6- Creating)

CO – Course Outcomes

PO – Program Outcomes;