

416  
4/3/2020

Reg.No.:									
----------	--	--	--	--	--	--	--	--	--



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.



Question Paper Code: 7001

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020

Third semester

Electronics and Communication Engineering

U15EC301 – ELECTRON DEVICES

(Regulation 2015)

Time : Three Hours

Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks).

1. List the Parameter and applications of PN Diode.
2. Draw the V-I characteristics and equivalent circuit of Tunnel diode.
3. Determine the VCE (sat) of bipolar transistor , if  $I_C=1mA$ ,  $\alpha_F=0.99$ ,  $\alpha_R=0.20$  and  $I_B=50\mu A$ . Assume  $T=300 k$ .
4. What is early effect?
5. Define Pinch-off voltage in a JFET.
6. Draw the symbol and distinguish between N and P channel FET.
7. What are photoluminescence & luminescence efficiency.
8. Write the advantages of hetero-junction solar cell.
9. Define breakdown voltage and latching current of SCR.
10. What is negative resistance region in UJT?

PART – B

(5 x 13 = 65 Marks)

11. a) Discuss the function of PN junction diode under forward and reverse bias condition.

(OR)

- b) Explain the principle and operation of varactor diode and Transfer Electron Device (TED) diode with neat diagram.
12. a) i. Examine the input characteristics and output characteristics of BJT in CE configuration. (8)  
ii. Compare the parameters between CB, CC and CE configurations. (5)
- (OR)
- b) i. Analyze the h-parameter model of a transistor with relevant expressions and a neat sketch. (7)  
ii. Explain in detail about Heterojunction Bipolar Transistor of basic NPN transistor. (6)
13. a) Explain the working mechanisms of Enhancement and Depletion type MOSFET with relevant sketch.  
(OR)
- b) Explain the n-channel JFET working principle & derive the small signal model for FET.
14. a) Summarize how a solar cell works? Why GaAs solar cells are more efficient than Si solar cell?  
(OR)
- b) Describe the constructional features and characteristics of Photo transistor.
15. a) Explain the construction and operation of UJT along with its V-I characteristics.  
(OR)
- b) Explain the working mechanism of DIAC, TRIAC and PIN photodiode.

PART - C

(1 x 15 = 15Marks)

16. a) i. Determine the ideal reverse saturation current density in a silicon pn junction at  $T = 30$  K. Consider  $N_a = N_d = 10^{16} \text{cm}^{-3}$ ,  $n_i = 1.5 \times 10^{10} \text{cm}^{-3}$ ,  $D_n = 25 \text{cm}^2/\text{s}$ ,  $D_p = 10 \text{cm}^2/\text{s}$ ,  $\tau_{p0} = \tau_{n0} = 5 \times 10^{-7} \text{s}$ ,  $\epsilon_r = 11.7$ . (8)
- ii. Consider a Si PN junction at  $T = 300$  K with doping concentrations of  $N_a = 10^{16} \text{cm}^{-3}$  and  $N_d = 10^{15} \text{cm}^{-3}$ . Assume that  $n_i = 1.5 \times 10^{10} \text{cm}^{-3}$ . Calculate width of the space charge region in a PN junction, when a reverse bias voltage  $V_R = 5\text{V}$  is applied. (7)

(OR)

- b) An SCR half-wave rectifier has a forward breakdown voltage of 150 V when a gate current of 1mA flows in the gate circuit. If a sinusoidal voltage of 400 V peak is applied, find:
- firing angle
  - average output voltage
  - average current for a load resistance of  $200\Omega$
  - output power.
- Assume that the gate current is 1mA throughout and the forward breakdown voltage is more than 400 V when  $I_g = 1\text{mA}$ .

