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Code No. : 13404 S

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (ECE: CBCS) III-Semester Supplementary Examinations, May/June-2018**

**Electronic Materials & Devices**

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

**Part-A (10 × 2 = 20 Marks)**

1. Differentiate between Drift and Diffusion currents of P-N Junction diode.
2. Find the concentration (densities) of holes and electrons in N-type silicon at 300K, if the conductivity is 300 S/cm. Also find these values for P-type silicon at 300K,  $n_i=1.5 \times 10^{10}/\text{cm}^3$ ,  $\mu_n=1300 \text{ cm}^2/\text{V-s}$  and  $\mu_p=500 \text{ cm}^2/\text{V-s}$ .
3. Calculate the value of capacitance to be used in a capacitor filter connected to a Full wave rectifier operating at a standard frequency of 50Hz, if the ripple factor is 10% for a load resistor of 500  $\Omega$ .
4. Discuss the characteristics of Varactor diode and mention its applications.
5. What is Early effect? Explain how it affects the characteristics of BJT in CB configuration.
6. Draw the circuit of CE amplifier using collector to base bias circuit and comment on how the stability can be improved.
7. Draw the equivalent h-parameter model for CC configuration.
8. List the differences between TRIAC and DIAC switches.
9. Comment on the transfer characteristics of EMOSFET and DMOSFET.
10. Prove that the amplification factor  $\mu$  of JFET is  $\mu = g_m r_d$ .

**Part-B (5 × 10 = 50 Marks)**

11. a) Explain the V-I characteristics of a zener diode and explain its working as a voltage regulator. [6]  
b) The Reverse saturation current of a silicon diode is 12  $\mu\text{A}$ . Compute the current flowing through the diode when the applied forward bias voltages are 0.5 V, 0.6 V and 0.7 V at room temperature. [4]
12. a) Derive the ripple factor of full wave rectifier with LC filter. [5]  
b) Explain V-I characteristics of Tunnel diode. List out its Applications. [5]
13. a) Explain how transistor acts as an amplifier? Compare the various configurations of BJT in terms of input and output resistances, voltage and current gains and its applications. [5]  
b) For a self-bias circuit  $R_C=5.6\text{k}$ ,  $V_{CC}=22.5 \text{ V}$  and a silicon transistor with  $\beta=50$  is used. It is desired to establish a Q-point at  $V_{CE}=12 \text{ V}$ ,  $I_C=1.5\text{mA}$  and stability factor  $S \leq 3$ . Find  $R_e$ ,  $R_1$  and  $R_2$ . [5]
14. a) A BJT having  $h_{ie}=1500\Omega$ ,  $h_{fe}=100$ ,  $h_{re}=2 \times 10^{-5}$ ,  $h_{oe}=25 \times 10^{-6} \text{ A/V}$  is used as an emitter follower with  $R_s=1000 \Omega$  and  $R_L=500 \Omega$ . Determine voltage gain, current gain, input and output resistance using exact analysis. [6]  
b) Explain the operation of SCR. List its applications. [4]

- 15. a) Draw and explain the small signal model of a JFET at low frequencies. [5]
- b) Explain the basic operation and characteristics of enhancement type MOSFET. [5]
  
- 16. a) Explain the effect of temperature on p-n junction diode. [4]
- b) What is a photo diode? Explain the construction and working principle of photo diode. [6]  
        List its applications.
  
- 17. Answer any *two* of the following:
  - a) Write short notes on bias compensation techniques of BJT. [5]
  - b) Explain V-I characteristics of UJT. [5]
  - c) Write short notes on CMOS. [5]

