

FACULTY OF ENGINEERING
B.E. 2/4 (ECE) I Semester (New) (Main) Examination, December 2011
ELECTRONIC DEVICES

Time: 3 Hours]

[Max. Marks: 75

Note : Answer *all* questions from Part A. Answer *any five* questions from Part B.

PART – A**(25 Marks)**

1. Describe in your own words how diffusion and transition capacitances differ. 3
2. A silicon diode dissipates 3W for a forward dc current of 2A. Calculate forward voltage drop across the diode and its bulk resistance. 2
3. What is meant by Tunneling effect ? 2
4. A half-wave rectifier circuit has a 25V (rms) sinusoidal ac input and a 600 Ω load resistance. Calculate the peak O/P voltage, peak load current and the diode peak reverse voltage. Assume $V_F = 0.7$ V. 3
5. What is the need for biasing a transistor. 3
6. The following quantities are measured in a transistor. 3
 $I_C = 5$ mA; $I_B = 100$ μ A. Determine α , β and I_E .
7. Draw the transistor hybrid model for CE transistor configuration. 2
8. What is meant by thermal run away ? 2
9. What are the advantages of MOSFET over JFET ? 3
10. List the advantages and disadvantages of FET over BJT. 2

PART – B**(50 Marks)**

11. a) Consider a p-n alloy-junction germanium diode with $N_D = 10^3 N_A$ and with N_A corresponding to 1 donor atom per 10^8 germanium atoms. Calculate the height E_0 of the potential – energy barriers in electron volts at room temperature. (Assume $n_i = 2.5 \times 10^{13}$ (m^{-3} at 300° k). 4
- b) Explain the V-I characteristics of a zener diode and explain its working as a voltage regulator. 6

12. a) Explain the operation of center tapped FW rectifier with π filter. 5
 b) Design a power supply using π -section filter to given dc O/P of 25V at 100 mA with a ripple factor not to exceed 0.001%. 5
13. a) Explain how transistor acts as an amplifier, give an example. 5
 b) What is early effect ? Explain how it affects the BJT characteristics in common base configuration. 5
14. a) 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 , R_2 . 5
 b) Explain the operation of UJT. 5
15. a) Why are the h-parameters preferred to analyse a circuit using BJT. 3
 b) A BJT having $h_{ie} = 1500 \Omega$, $h_{fe} = 100$, $h_{re} = 2 \times 10^{-5}$ and $h_{oe} = 25 \times 10^{-6} \text{ A/V}$ is used as an emitter follower amplifier with $R_S = 1000 \Omega$ and $R_L = 500 \Omega$. Determine for the amplifier A_v , A_{vs} , A_{is} , R_{in} and R_{out} . 7
16. a) Sketch and explain the small-signal model of an FET at low frequencies. 4
 b) An n-channel JFET amplifier uses FET for which $V_P = -2.0 \text{ V}$, $g_{mo} = 1.60 \text{ mA/V}$ and $I_{DSS} = 1.65 \text{ mA}$. It is desired to bias the circuit at $I_D = 0.8 \text{ mA}$. Using $V_{DD} = 24\text{V}$. Assume $r_d \gg R_d$. Find
 a) V_{GS} b) g_m c) R_s d) R_d .
 Such that the voltage gain is atleast 20 dB, with R_s by passed with a very large capacitance C_s . 6
17. Write short notes on the following :
 a) TRIAC 3
 b) LED 3
 c) Bias compensation techniques of BJT. 4