

Code No: 113AU

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, December-2014

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

Part- A**(25 Marks)**

- 1.a) Write the Difference between drift and diffusion current. [2M]
- b) Explain about Photo diode. [3M]
- c) What are PIV and TUF? [2M]
- d) How Zener diode acts as a Voltage regulator. [3M]
- e) Explain the early effect. [2M]
- f) Why Common Collector Amplifier is called as emitter follower? [3M]
- g) What are the salient features of Hybrid parameters? [2M]
- h) Write the condition for thermal stability. [3M]
- i) Define pinch-off voltage [2M]
- j) Why FET is called voltage variable resistor? [3M]

Part- B**(50 Marks)**

- 2.a) Write the volt-ampere equation for P-N junction diode. Draw and explain the V-I characteristics and discuss the effect of temperature on the characteristics.
- b) Explain about Breakdown Mechanisms in Semiconductor Diodes.
- c) Draw and explain the characteristics of Varactor Diode.

OR

- 3.a) Discuss about Zener Diode Characteristics.
 - b) Explain the Principle of Operation of Tunnel Diode.
 - c) Derive the Expression for Diode Equation.
- 4.a) Draw and explain the circuit diagram of full wave rectifier with L- section filter.
 - b) A bridge rectifier is used to supply d.c load of 20 A at 20 volts from 117 volts source. What is the rating of power transform?
 - c) Derive the expression for the regulation and efficiency of a half wave rectifier.

OR

- 5.a) Draw the circuit for a full-wave rectifier. And derive the expression for
 - i) the DC current
 - ii) the DC load voltage
 - iii) the rms current.
- b) Find the average value of the output voltage, peak diode current and PIV of the Half Wave Rectifier. Assume v_s is 12V (rms) Sinusoidal and $R_L=100\Omega$.
- c) Define the following terms with necessary equations:
 - i) Voltage gain
 - ii) Power gain
 - iii) Efficiency.

- 6.a) Explain how the BJT can be used as an amplifier and as a Switch.
- b) Explain the V-I characteristics in Common Emitter Configuration.
- c) Compare the transistor (BJT) amplifiers circuits in the three configurations with the help of h-parameters values.

OR

- 7.a) Draw and explain the output characteristics of BJT in common-base configuration.
 - b) Draw and Explain the V-I characteristics of UJT.
 - c) A transistor is operated at a forward current of $2\mu\text{A}$ and with the collector open circuited. Calculate the junction voltages V_C and V_E the collector to emitter voltage V_{CE} assuming $I_{CO} = 2\mu\text{A}$, $I_{EO} = 1.6\mu\text{A}$ and $\alpha_N = 0.98$.
- 8.a) What are the H-Parameters and write the h-parameters for transistor CE amplifier.
 - b) Determine the base resistor R_b for fixed bias on collector to base bias and compare the stability factor S for both of them. Given $V_{CC} = 12\text{V}$, $R_L = 330\Omega$, $I_b = 0.3\text{mA}$, $\beta = 100$, $V_{CEQ} = 6\text{V}$
 - c) Compare different transistor biasing techniques.

OR

- 9.a) Define operating point and explain clearly the DC and AC load line.
 - b) Derive the expression for the stability factor for self bias.
 - c) Draw and explain the diode compensation technique in detail.
- 10.a) Explain Volt-ampere Characteristics of JFET.
 - b) How FET act as a voltage controlled device and analyze low frequency CD amplifier.
 - c) A FET has a driven current of 4mA if $I_{DSS} = 8\text{mA}$ and $V_{GS(off)} = -6\text{V}$. Find the value of V_{GS} and V_p .

OR

- 11.a) Deduce the condition for JFET biasing for zero drift current.
- b) Draw and explain the operation of Enhancement type MOSFET.
- c) Briefly discuss the source follower.
