

II B. Tech I Semester Supplementary Examinations, January 2017

ELECTRONIC DEVICES AND CIRCUITS

(Electronics and Communication Engineering)

Time: 3 Hours**Max. Marks: 60****Note:** All Questions from **PART-A** are to be answered at one place.Answer any **FOUR** questions from **PART-B**. All Questions carry equal Marks.**PART-A****6 × 2 = 12M**

1. Write the differences between step-graded and linearly-graded semiconductor p-n junctions.
2. Write the applications of the diode.
3. Define threshold voltage.
4. Define Transconductance of MOSFET.
5. What is Early effect.
6. Draw the frequency response of an amplifier.

PART-B**4 × 12 = 48M**

1. a) Derive the equation for the total current through the diode for forward and reverse bias. (8M)
b) Explain the breakdown mechanisms of a p-n junction under reverse bias condition. (4M)
2. a) Explain the operation of a diode half wave rectifier with the help of circuit diagram and waveforms. (6M)
b) Explain the operation of Zener diode and its application. (6M)
3. a) Explain the operation of n-channel JFET with neat sketches. (6M)
b) Write the advantages of FET over BJT. (6M)
4. a) Explain the operation of the enhancement mode NMOS transistor with the help of Characteristics. (6M)
b) Derive the I_D - V_{DS} relationship for NMOS Transistor. (6M)
5. a) Explain the operation of BJT as an amplifier and as a switch with neat diagrams. (6M)
b) Discuss various biasing techniques used in BJT Amplifier Circuits. (6M)
6. a) Explain the operation of Common Source MOSFET amplifier and derive the expressions for voltage gain, open – circuit voltage gain, overall voltage gain. (6M)
b) Calculate the overall voltage gain G_v of a common source amplifier for which $g_m = 2 \text{ mA/V}$, $r_o = 50 \text{ K}\Omega$, $R_D = 10 \text{ K}\Omega$, and $R_G = 10 \text{ M}\Omega$. The amplifier is fed from a signal source with a Thevenin resistance of $0.5 \text{ M}\Omega$, and the amplifier output is coupled to a load resistance of $20 \text{ K}\Omega$. (6M)