**Practice Questions (Descriptive/ Conceptual):**

1. Describe the formation of a junction capacitance in a *pn* junction diode. [5 marks]
2. Explain avalanche and zener breakdown phenomena. [4 marks]
3. State the differences between series and shunt clipper circuits. [3 marks]
4. Explain Early and Miller effects in brief. [5 marks]
5. Draw and describe the structure (cross-section) of a practically viable *npn* BJT and explain its operation in detail with relevant characteristic plots. [10 marks]
6. Explain with diagrams the role of a BJT amplifier circuit (common emitter) in exhibiting a band-pass like frequency response characteristics. [5 marks]
7. Draw and explain the modes of operation of transistor circuits as: i) Switch for operating an LED; ii) Logic gate (any); iii) Voltage Amplifier; iv) Current Amplifier. [8 marks]
8. Highlight the unique characteristics of semiconductors in its intrinsic and extrinsic states, as compared to metals like gold. [4 marks]
9. Compare between a transconductance and a transresistance amplifiers. [4 marks]
10. Explain the band diagrams of a *pn* junction semiconductor during various biasing conditions. [6 marks]
11. Describe excess carriers generation and carrier recombination. [4 marks]
12. Explain direct and indirect band-gap in semiconductors. Write three example materials for each of the types. [6 marks]
13. Draw necessary diagrams and explain a third order RC high pass filter. What is the expected roll-off rate and how do you calculate its cut-off frequency? [4 marks]
14. What is a quality factor of an R-L-C filter? [3 marks]
15. Design a first-order band pass filter for an audio application. [4 marks]
16. Draw a block diagram of a typical linear power supply with a voltage regulator. Explain its operation. [6 marks]
17. Draw a diode clamper circuit for shifting a zero-volt symmetric input waveform by -4 V at its output. [4 marks]
18. Explain the h-parameter equivalent modeling scheme in BJTs in detail. How does it differ from hybrid-pi? [5 marks]
19. What is a gain-bandwidth product? Explain with a suitable example. [5 marks]
20. State and explain the differences between a DC load line and an AC load line, pertaining to a BJT amplifier. [5 marks]

**Practice Questions (Numerical):**

Refer to old exam question papers (last 3 years), tutorials (both class and email documents) and class test.