SEMICONDUCTOR DEVICES.

EXAMINATION TOPICE 2004 (January 2005)

1. CRYSTAL STRUCTURE (lattice, unit cells, structures of semiconductors , Miller indices)
2. VALENCE-BAND MODEL OF SOLID (energy-band diagram of semiconductor, metal, insulator)
3. INTRINSIC SEMICONDUCTORS (Fermi-Dirac distribution f.,carrier density)
4. DONORS AND ACCEPTORS (P-type and N-type semiconductors)
5. EXTRINSIC SEMICONDUCTORS (Fermi –levels, carrier density, charges in P and N type semiconductors)
6. DRIFT AND DIFFUSION CURRENTS (drift velocity,conductivity,diffusion)
7. GENERATION AND RECOMBINATION PROCESSES. (continuity of carrier flow)
8. SEMICONDUCTOR DEVICES TECHNOLOGY (crystal growth technique, impurity diffusion, planar technology)
9. PN-JUNCTION AT THERMAL EQUILIBRIUM (energy-band diagram, build-in potential)under forward- and reverse-bias condition,)
10. PN-JUNCTION UNDER FORWARD BIAS CONDITION (diffusion current, diffusion capacitance);
11. PN-JUNCTION UNDER REVERSE-BIAS CONDITION (junction capacitance, avalanche breakdown, Zener effect);
12. PN DIODES (DC characteristics, AC parameters, applications)
13. BIPOLAR JUNCTION TRANSISTOR ACTION (energy-band diagram,amplification factors)
14. BIPOLAR JUNCTION TRANSISTORS DC CHARACTERISTICS (input, output, transfer);
15. EBERS-MOLL LARGE SIGNAL MODEL
16. SMALL-SIGNAL PARAMETERS (h-, y-, z- parameters, equivalent circuits);
17. FREQUENCY RESPONSE OF A JBT (cut-off frequency, drift transistor);
18. JUNCTION FIELD-EFFECT TRANSISTORS
19. MOS-DIODE (energy band diagram, accumulation-, depletion-, inversion- layers);
20. MOS-TRANSISTOR ENERGY-BAND DIAGRAMS (depletion, inversion and accumulation conditions);
21. THRESHOLD VOLTAGE IN MOS TRANSISTORS
22. MOS DC CHARACTERISTICS (output, transfer, linear and saturation region),
23. CHARGE-TRANSFER DEVICES (CCD, charge transfer, injection, detection, application);
24. POWER ELECTRONIC DEVICES (silicon-controlled rectifiers, thyristors, JBT-MOS devices)
25. INTEGRATED CIRCUITS (technology, analog and digital IC)
26. LIGHT EMITTED DEVICES (LED, semiconductor LASER);
27. LIGHT DETECTION DEVICES (photo-diode, photo-transistor);
28. SEMICONDUCTOR MODELS FOR COMPUTER AIDED IMPLEMENTATION
29. DYNAMIC PROPERTIES OF SEMICONDUCTOR DEVICES
30. TEMPERATURE EFFECT ON SEMICONDUCTOR DEVICES CHARACTERISTICS

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