**QUESTIONS:**

1. What were the most important facts for the development of electronics? microelectronics?
2. What is the major difference between electronic systems and microelectronic devices?
3. What is a transistor? When was the first practical transistor built?
4. Why could not early transistors satisfy the needs of the growing high-speed computers industry and microwave communication systems?
5. What are the advantages of transistors compared to vacuum tubes?
6. What new possibilities did the advent of the transistor open?
7. What are the main types of transistors? Where are transistors used?
8. Why is the size of transistors of prime importance?
9. What are the principal elements of electronic circuits?
10. What technological processes are used in the fabrication of integrated circuits?
11. Why does the IC package play a fundamental role in the operation and performance of a component?
12. What IC packaging techniques are used nowadays?
13. What are the main requirements for a good IC package?
14. What are the most common materials used for the IC package body?
15. What interconnection strategy does the traditional packaging approach use?
16. How does the packaging technology influence the performance of a processor?
17. What can you say about the steady reduction of IC feature sizes?
18. What has allowed the integration of more and more devices on the same chip?
19. What are the dominant factors limiting device performance?
20. What can you say about polycrystalline materials?
21. What are semiconductors? What are the main properties of the semiconductors?
22. What are the most widely used semiconductor materials?
23. Why are they called semiconductors?
24. What is the operation of a semiconductor based on?
25. How can we change the ability of semiconductors to conduct electricity?
26. Where are semiconductors used?
27. What materials are called intrinsic?
28. What makes silicon an indispensable material in microelectronics?
29. What is the physical nature of semiconductor materials?
30. What does the resistance of a semiconductor depend on?
31. When does the semiconductor material act as an insulator?
32. When does the semiconductor conduct?
33. What is the simplest semiconductor device and how does it operate?
34. When does diode conduct electricity?
35. What can you say about a crystal of pure silicon? Why is a crystal of pure silicon a poor conductor?
36. Why is conductivity one of the basic requirements imposed on materials?
37. Can you name one of the ways to improve conductivity?
38. What way can you change the behavior of silicon?
39. What is doping? What are donors? What are acceptors?
40. What types of impurities are there in the silicon crystal?
41. What are the main dopants?
42. How do holes behave in the p-type region?
43. What is the difference between n-type silicon and p-type silicon?
44. Is the P-type silicon a good conductor?
45. What does p-n-p junction mean?
46. What are three forms of expressing Ohm’s Law?
47. What do letters I, V and R represent?
48. What is another way of representing Ohm’s Law? Who developed it?
49. What is current? What types of current can you remember? What is the difference between them?
50. What is resistance? What is it measured in?
51. What is voltage? What is it measured in?
52. Why is voltage a specific measure of potential energy?
53. What is conductivity? What is conductivity measured in?
54. What is conductance measured in?
55. What is the difference between conductance and conductivity?
56. In what way does conductance depend on resistance?
57. What does metrology study?
58. When did metrology start as a science?
59. When was the international System of Units (SI) established?
60. How measurements are made in each country?
61. In which fields of industry can we apply metrology?
62. What is quantum optics?
63. Who explained (expanded) the photon theory of light?
64. Explain the meaning of the phrase “wave particle duality”.
65. What is the field of main application of quantum optics?
66. Why do we use fiber optic technology?
67. Which advantages do optical fibers have for communication applications?
68. Which two basic elements does every optical fiber have?
69. What kind of glass are optical fibers made of?
70. Will the light multiple modes if we launch a single pulse of light into a fiber?
71. Explain the steps of photolithography process.
72. What is electron beam lithography (EBL)? How does it work?
73. Compare electron beam lithography (EBL) with a conventional photolithography. Tell us about the advantages and disadvantages of each method.
74. What does laser stand for? What does maser stand for? Can you explain the difference between “maser” and “laser”?
75. What can you say about the typical structure of the laser?
76. What is peculiar about one of the laser's mirrors?
77. Why is one of the laser’s mirrors partially transparent?
78. What is the gain medium of a laser? What types of laser gain medium do you know?
79. What two types of emission do you know?
80. What does one need to start the process of stimulated emission?
81. How is typically the energy supplied to the gain medium? What is pumping?
82. How can population inversion be reached in lasers?
83. What differs laser light from conventional light sources?
84. What types of lasers do you know? Tell us about any type of lasers.
85. What modes of operation of lasers are there?