

Study titles CCP

University year 2018-2019

Note: These working titles don't represent the exact exam subjects in mode „ad litteram”, but are mandatory subjects to be prepared by the students. It is possible to combine or split some subjects.

1. Rated value and tolerance of passive electronic components, including statistical approach on tolerance.
2. Rated value and tolerance of passive electronic components, determination of rated values series.
3. Determination of tolerances of parameters of electronic circuits with respect to tolerances of passive components.
4. Determination of temperature coefficient of an electronic circuit with respect to temperature coefficients of passive components.
5. Mechanisms of heat flow; computation formulae.
6. Energy balance and component temperature dependence on dissipated power (time evolution of the body of passive component).
7. Heat transmission through terminals, used model and remarkable particular results for passive components applications.
8. Rated power and maximum allowed thermal power, impulse regime.
9. Determination of required rated power with respect to the dissipated power, inclusive impulse regime.
10. Type (class) of resistors. Comparative comments on different types of resistors having in view: nominal value, tolerance, temperature coefficient, rated power, temperature domain, etc.
11. General constructive structure of resistors. Detail on resistive element.
12. General constructive structure of resistors. Detail on insulating support (substrate), contact zone, terminals and protection element.
13. Dimensioning of resistive element for wirewound resistors.
14. Dimensioning of resistive element for cylindrical film resistors.
15. Dimensioning of resistive element for thick film resistors.
16. Resistors used as current sensors (shunt), including four terminals resistors. Constructive solution for shunt resistors. Zero ohm resistors.
17. Resistive networks, variants, advantages.
18. Resistors noise.

19. Frequency behavior of resistors; equivalent circuits, resistor impedance.
20. Variable resistors.
21. Digital potentiometers.
22. NTC thermistors, materials, realization principle, technology, thermal characteristic, parameters.
23. Voltage – current $U(I)$ characteristic of NTC thermistors.
24. Series-parallel grouping of NTC thermistors and resistors.
25. Applications of NTC thermistors in indirect heating regime.
26. Applications of NTC thermistors in direct heating regime.
27. Ceramic PTC thermistors, materials, realization principle, thermal and electrical characteristics, parameters.
28. Applications of PTC thermistors in indirect heating regime.
29. Applications of PTC thermistors in direct heating regime.
30. Usage of PTC thermistors in electronic circuit protection; explanation using graphs. Polymeric PTC thermistors.
31. Varistors, materials, realization principle, electric characteristic, parameters, equivalent circuit.
32. Constructive structure of varistors; multilayer varistors; feed-through varistors.
33. Applications of varistors.
34. Surge arresters, principle of realization, constructive variants, applications.
35. Explanation on surge arrester operation, protection principle, parameters.
36. Capacitors, introductory notions, main parameters, principal classes of capacitors having in mind the dielectric materials.
37. General constructive structure of capacitors. Detail on dielectric.
38. General constructive structure of capacitors. Details on plates, contact zone, terminals and protection element.
39. Equivalent circuit and frequency behavior of capacitors (capacitor impedance).
40. Electrical stress of capacitors in a frequency range.
41. Film capacitors, constructive variants and mixed type dielectric capacitors.
42. Ceramic capacitors, variants, dielectric type, performances.

43. Variable capacitors with air and solid dielectric, realization principle. Variation of capacitance for varicap diodes.
44. Electrochemical double-layer capacitors (supercapacitors), Brief description of operation principle, structure, construction, materials.
45. Application of electrochemical double-layer capacitors (supercapacitors); problems in using EDLCs in series connection (Balancing).
46. Inductors, introductory theoretical notions, quality factor, series and parallel equivalent circuit, parasitic capacitance, self resonant frequency.
47. Frequency behavior of inductors.
48. Electrical stress of inductors in a frequency range.
49. Types of inductors: resin molded inductors, shielded inductors, ring (toroid) type, pot core, air core inductors, variable inductors. General description and application domain.
50. Types of inductors: „chip” multilayer inductors, integrated inductive components in DIL capsules. General description and application domain.
51. Applications of inductors: Electromagnetic Interference (EMI) reduction with ferrite core. RFID (Radio Frequency Identification) systems.

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