

**Final, master exam question list for**

Geoinformation and Spatial Management

1. Spatial and temporal changes in the anthropopressure factors.
2. Autonomous or subordinated landscape, which of them is more susceptible to anthropogenic pressure, justify your opinion.
3. The utility meaning of gradient phenomena and geochemical barriers.
4. Parameters needed to calculate maximum retention in the Soil Conservation Service Curve Number (SCS-CN) method.
5. Application of geostatistical methods to assess spatial or temporal variability in natural environment research and exploration
6. The importance and practical use of semivariance and semivariogram in modeling spatial phenomena
7. The reasons and effect of urban heat island.
8. Methods of environmental impact assessments.
9. Typical good practices in public consultations of EIA.
10. Principles of sustainable development.
11. Ecosystem services - definition and classification.
12. Essence of external costs (give one example)
13. Concept of bioeconomics (definition and importance in present economy).
14. Types of resolution concerning satellite data.
15. Define basic characteristics of remote sensing data (spatial, spectral, radiometric and temporal resolution).
16. List and discuss application of LIDAR products.
17. List and discuss differences between Sentinel-2 and Landsat-9 data.
18. List and discuss differences between active and passive sensors.
19. List and discuss three selected satellites for environmental applications.
20. How do drones measure height?
21. What is the difference between multi-rotor and fixed-wing UAVs - describe the advantages and disadvantages of these constructions. In which missions multi-rotor is a better choice than fixed-wing UAV?
22. Flight categories in the European Union.
23. Rules that should be followed when flying a drone in the open category.
24. Please define the functional areas and give 5 examples of functional urban areas.
25. Please discuss the purpose and rules of functional urban areas delimitation.
26. Significance and application of Remote Sensing in environmental engineering, agriculture, forestry, geology, etc.
27. Features and properties of municipal infrastructure.
28. The arrangement of elements of the water supply infrastructure and the reliability of water supply.

29. Social, technical and economic criteria in planning sewerage systems according to their types.
30. Distributed energy production in municipal applications.
31. What kind of basic data models are used in GIS and what is the difference between them?
32. Explain the idea behind selected multilayer operation on vectors (union, intersection, symmetrical difference, identity, clip, erase, split)
33. What is the difference between focal statistics and block statistics applied for raster data?
34. List and describe basic types of flood, which you know.
35. What are warning and alert stages in flood protection?
36. Describe types of dikes.
37. Rural engineering definition and aims. What human activities and engineering specialties are covered by rural engineering. Rural engineering scale of operation.
38. Definition of irrigation. Types of irrigation in term of water distribution and distribution.
39. What are the advantages and disadvantages of 3D laser scanning
40. An electromagnetic radiation with  $\lambda=1000$  nm passes through the atmosphere. It interacts with Gas molecules with a diameter of 1 nm and Sand particles with a diameter of 1 mm. Explain the scattering mechanism that applies between the electromagnetic radiation and the atmosphere for each case.
41. From astronomy, we know that all stars undergo evolution. Suppose the Sun will reduce its temperature to the half of the current value. Describe how Sun radiation will change.
42. You would like to discriminate the "Grass" and "Dry, yellowed grass" in an RS image data set. Suggest one spectral range (with a maximum width of 0.1 micrometers) in the visible range that can best be chosen to discriminate between the two objects
43. The object of interest is orchards/tree nurseries of olive trees. The individual trees are planted 10 meters apart. Their crown diameter is 3 meters. Suggest the spatial characteristic ground sampling distance (GSD) of the sensor to be used.
44. Suppose we have a data set with three bands with the following wavelength range in micrometer: I: 0.7-0.9, II: 0.9-1.4, III: 0.61-0.7. Is possible to obtain a true colour composite? Explain briefly your answer.
45. There are two complementary colour systems; the additive and the subtractive colour system. For what purpose is the additive system used, and for what purpose is the subtractive system used?
46. In the collinearity concept (image orientation – photogrammetry), which points should be on the same line? Use a diagram to clarify your answer.
47. For the exterior orientation of single aerial image. Describe the minimum requirements for ground control points.
48. For the exterior orientation of single aerial image. Enlist one source of error in case of exterior orientation.
49. Give the names of the (3) three different orientation steps, and then list the number of the unknown or known parameters for each of the three orientations.
50. What are the main elements of image-based modeling that are calculated in the relative orientation process of drone images?
51. What is the difference between DTM (Digital Terrain Model) and DSM (Digital Surface Model)? Clarify your answer by drawings.
52. For high-rise urban areas you have the choice o generate an orthophoto or true orthophoto. Which one do you choose and why? Clarify your answer.

53. Explain what problem will you encounter in the region of the high-rise buildings after orthorectify the image? How do you solve this problem? Explain the process.
54. How can you evaluate/ assess the positional accuracy of the produced orthophoto? Explain briefly.
55. What are the main spectral bands considered in multispectral UAV based cameras?
56. Mention separately examples of an application of thermal cameras and multispectral cameras.
57. Imagine you have a stereo-imagery and an orthophoto of a road in the mountains which you must map with a high positional accuracy. Would you choose to digitize the road from the orthophoto or stereo-plotting and why? Promote your answer by comparing the accuracy of both methods and name three sources of error which contribute to the error estimation.