



Topics and outline of questions

for entrance examination to Master-level study programme

EUROPEAN FORESTRY

for academic year 2015/16

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TOPICS OF STATE BACHELOR EXAM STUDY PROGRAMME FORESTRY

1. **Forest ecology (Forestry phytosociology and typology; Forest soil science; Forest ecology)**
2. **Forest regeneration and protection (Establishment of forests; Silviculture; Introduction to forest protection and forest phytopathology)**
3. **Technology of basic production processes in forestry (Technology in forestry, Basic processes in logging and transport of timber, Opening-up of forests)**
4. **Forestry management (Economics in forestry, Forestry legislation, Forest management)**

OUTLINE OF QUESTIONS FROM INDIVIDUAL TOPICS

Forest ecology

Forestry phytosociology and typology

Describe ^{A)}basic characteristics of abiotic environment (geological, geomorphological, climatic and soil situation), ^{B)} natural state of woody species synusia, ^{C)}main differentiating features of undergrowth synusia (with examples of significant indicating species), ^{D)}occurrence, ^{E)}significance, ^{F)}threats and ^{G)}current state of the geobiocoenoses of selected typological units category:

1. Dry pine forests – geobiocoenes of dry and limited hydric range (HR) with potentially determinant *Pinus sylvestris*
2. Scree and ravine forests - geobiocoenes of screes and ravines with potentially determinant *Acer* sp. (ev. other tree species)
3. Oak forests – geobiocoenes of the 1st (ev. 2nd or 3rd) forest vegetation zone with potentially determinant *Quercus petraea* without *Fagus sylvatica*
4. Beech-oak forests - geobiocoenes of the 2nd forest vegetation zone with potentially determinant *Quercus petraea* and with *Fagus sylvatica*
5. Oak-beech forests - geobiocoenes of the 3rd forest vegetation zone with potentially determinant *Fagus sylvatica* and with *Quercus petraea*
6. Beech forests - geobiocoenes of the 4th (ev. 3rd) forest vegetation zone with potentially determinant *Fagus sylvatica*
7. Fir-beech forests - geobiocoenes of the 5th forest vegetation zone with potentially determinant *Fagus sylvatica* and with *Abies alba*

8. Spruce-fir-beech forests - geobiocoenes of the 6th forest vegetation zone with potentially determinant *Fagus sylvatica*, *Abies alba* or *Picea abies*
9. Montane spruce forests - geobiocoenes of the 7th forest vegetation zone with potentially determinant *Picea abies*
10. *Pinus mugo* scrub - geobiocoenes of the 8th forest vegetation zone and of the peat series from lower-located vegetation zones with potentially determinant *Pinus mugo* or with *Betula sp.* or *Salix sp.* scrubs
11. Alluvial forests - geobiocoenes of river and stream floodplains
12. Alder carrs – geobiocoenes of wet HR with potentially determinant *Alnus glutinosa* or *Alnus incana*
13. Oak forests with *Quercus robur* and Fir forests – geobiocoenes of water-logged and wet HR with potentially determinant *Quercus robur* outside floodplain forests and *Abies alba*
14. Waterlogged spruce forests - geobiocoenes of water-logged and wet (ev. peat) HR with potentially determinant *Picea abies*
15. Bog forests - geobiocoenes of the wet to peat HR with potentially determinant *Picea abies* or *Pinus sylvestris* or *Pinus uncinata* subsp. *uliginosa*

Describe, which typological units – forest type groups (FTG), or geobiocene type groups (GTG) belong to the selected category and how it is related to the management set of stands (MSS).

Note: The applicant is provided with a tabular sheet of forest type groups (FTG), tabular sheet of geobiocene type groups (GTG) and a list of soil units.

Forest soil science

1. What is soil textural class and what is soil unit? What is the significance of both terms for forestry? How do we determine soil textural class and soil type?
2. Leptosols: significance for forest management
3. Regosols, Fluvisols and Vertisols: significance for forest management
4. Mollisols and Andosols: significance for forest management
5. Luvisol/Alfisols: significance for forest management
6. Cambisols/Brunisols/Inceptisols significance for forest management
7. Podzosols/Podzols: significance for forest management
8. Luvic Gleysols/Gleysols: significance for forest management
9. Organosols/Histosols and Antrosols: significance for forest management
10. Explain the terms soil acidity, soil buffering and soil sorption. What is the significance of these characteristics for forest management?
11. Origin and development of forest soils from the aspect of permanent production conditions of forest sites.

12. Soil mineral nutrients, forest soil as a source of nutrients allowing establishment and development of a high-quality, healthy and resistant forest stand.
13. Nutrition and fertilization of forest soils. Keeping and improving productivity of soil in forest nurseries through addition of fertilizing substances. Operative interventions, principles of fertilization and composting.
14. Forest soil as a category of land resources of the Czech Republic. Soil taxonomy in forestry, review of the main soil units within the land designated to fulfil the function of a forest in the Czech Republic.
15. Forest soils and their fauna, links between soil fauna and the content and quality of humic substances in forest soils, humus forms in forest sites.

Forest ecology

1. Forest as a functional integrated system, the main driving factors of forest ecosystem development
2. Functions of climate in forest ecosystems
3. Functions of soil in forest ecosystems
4. Historical development of forests – forest development during the Holocene, influence of climate, soil, biotic factors and humans
5. Exchange of energy and substances, primary production, productivity of forest ecosystems
6. Significance of fauna in forest ecosystems, secondary production, trophic relationships
7. Biogeochemical cycles of nutrients in forest ecosystems, mineral nutrition, current issues, possibilities of their handling
8. Species, populations, coenoses – life forms, strategies, natural regulation, colonization and invasions
9. Interspecies interactions in forest ecosystems
10. Stress theory, ecological stability and variability in forest ecosystems
11. Ecological aspects of sustainable forestry, criteria, indicators, applications in forest management
12. Biodiversity in forest ecosystems – definition, levels, changes over time and spatial changes, methods of evaluation, current issues, possibilities of forest management
13. Landscape aspects – significance of forest within landscape, Territorial system of ecological stability, interactions with other ecosystems, biogeochemical principles in landscape
14. Global aspects of forest ecosystem protection, the main current ecological issues, international conventions and organizations

Forest regeneration and protection

Establishment of forests

1. Reproduction material of forest woody species, its categories and sources
2. Seed-production zoning and rules of reproduction material transfer
3. Terms, methods and technology of seed and fruit collection, legislation related to seed collection, seed storage
4. Planting stock classification – quality criteria and their determination, types of forest nurseries
5. Sorting, transport, handling and storage of planting stock
6. Site preparation for forest regeneration (mechanical, biological, chemical)
7. Spacing and amount of planting stock per hectare of cleared area, mixtures of tree species
8. Afforestation of weed-infested sites (ecotope analysis, prevention, site preparation, suitable woody species, spacing, density, species mixtures, type, kind and time of regeneration, care of young plantations)
9. Afforestation of frost pockets (ecotope analysis, prevention, site preparation, suitable woody species, spacing, density, species mixtures, type, kind and time of regeneration, care of young plantations)
10. Afforestation of mountain and alpine elevations (ecotope analysis, prevention, site preparation, suitable woody species, spacing, density, species mixtures, type, kind and time of regeneration, care of young plantations)
11. Afforestation of inundation areas and waterlogged sites (ecotope analysis, prevention, site preparation, suitable woody species, spacing, density, species mixtures, type, kind and time of regeneration, care of young plantations)
12. Afforestation of sandy soils (ecotope analysis, prevention, site preparation, suitable woody species, spacing, density, species mixtures, type, kind and time of regeneration, care of young plantations)
13. Afforestation in areas affected by air-pollution (ecotope analysis, prevention, site preparation, suitable woody species, spacing, density, species mixtures, type, kind and time of regeneration, care of young plantations)
14. Care of young plantations – protection against game damage, weed and abiotic factors
15. Filling of blanks in plantations, interplanting, established plantation

Silviculture

1. Tending principles of spruce stands on acidic sites
2. Tending principles of spruce stands on nutrient-rich and water-affected sites
3. Tending principles of pine stands on natural pine sites
4. Tending principles of oak stands on acidic and nutrient-rich sites
5. Tending principles of beech stands on acidic and nutrient-rich sites in medium and higher elevations
6. Regeneration of forest stands - origin of the new stands (natural regeneration, artificial regeneration)
7. Regeneration of forest stands – clear-cutting system
8. Regeneration of forest stands – shelterwood system
9. Regeneration of forest stands – border-cutting system
10. Silvicultural systems of forest – conversion of low forests
11. Management systems of forest and their conversions
12. Tending measures in selection forests

Introduction to forest protection and phytopathology

1. Significant abiotic and biotic harmful agents (types and origin of damage, basic review).
2. Significant groups of woody species pathogens (viroids, viruses, bacteria, RLO, MLO, fungus-like Protista, fungi).
3. Rusts Uredinales – main representatives on woody species, bionomics, hosts, possibilities of control
4. Needle blights – main representatives on woody species, bionomics, hosts, possibilities of control
5. Diseases of roots, vascular mycoses, diseases of woody species assimilatory apparatus
6. Phytosanitary care – international and in the Czech Republic, impacts of quarantine pests spreading on forestry, imported diseases, causes of disease spreading
7. Pamphiliidae – review, significance, biology, main representatives
8. Tenthredinidae, Diprionidae, Cimbicidae and Siricidae - characteristics and significance for forest management
9. Lymantriidae – review, significance, biology, main representatives
10. Tortricidae, Geometridae, Cossidae and Noctuidae – review, significance, biology, main representatives
11. Scolytidae and Platypodidae – review, significance, biology, main representatives on individual woody species

12. Scarabaeidae, Buprestidae and Anobiidae – review, significance, biology, main representatives on individual woody species
13. Lymexylonidae and Cerambycidae – review, significance, biology, main representatives on individual woody species
14. Chrysomelidae, Attelabidae and Curculionidae – review, significance, biology, main representatives on individual woody species
15. Fungal diseases and insect pests of Norway spruce
16. Fungal diseases and insect pests of Scots pine
17. Fungal diseases and insect pests of European silver fir, Douglas fir and European larch
18. Fungal diseases and insect pests of oaks
19. Fungal diseases and insect pests of European beech
20. Fungal diseases and insect pests of sapwood broadleaved species
21. Fungal diseases and insect pests of willows and poplars
22. Fungal diseases and insect pests of seedlings and transplants, principles of protective measures in forest nurseries
23. Game damage to young plantations, types of damage, monitoring, evaluation of the extent of the damage and estimation of losses, liability for game damage
24. Estimation of the losses due to game damage to forest stands, liability, impact on growth and production of the stand
25. Principles of game population management in relation to game damage, protection and prevention
26. Assessment of the state of health of woody species in the Czech Republic, causes of decline of selected woody species

Technology of basic production processes in forestry

1. Principles and characteristics of functions of the basic structural elements and mechanisms of machines used in forestry (constructional materials, energy transfers, transmission systems, hydraulic and pneumatic systems, engines, fuels and lubricants, construction of chassis etc.).
2. Power equipment (tractors and skidders) in forestry. Main constructional conception, equipment and uses. Basic characteristics of tractor mechanics.
3. Production processes in forestry, technological and work operations – theoretical basis and main characteristics.
4. Importance of wood for human society. Integrated forest management, renewability of wood as a raw material. Volume and structure of harvested timber and ways of its use in the Czech Republic and in the world – basic data.

5. Timber cross-cutting to produce wood assortments, its aims, methods, Czech and basic foreign regulations for its realization. Technological quality and assortments of raw wood.
6. Scaling, recording, storage and protection of raw wood. Variants of wood acceptance by a customer (traditional scaling with measuring of wood dimensions, weight systems ATRO and LUTRO).
7. Log conversion depots, their specifications, technological equipment, functions and significance.
8. Principles of wood selling. Supervision of timber harvesting activities.
9. Standardization of working time consumption and its application in forestry production processes.
10. Harvesting systems and their main characteristics, relation between the harvesting system used and worksite preparation.
11. Organization of work in timber harvesting operations. Legislative requirements and principles of preparation and management of harvesting operations in forestry practice.
12. Production and technological conditions in timber harvesting and transport.
13. Technological characteristics of intermediate, main, incidental and salvage felling
14. Systematics of skidding in intermediate and main felling.
15. Non-mechanized types of technology and procedures in timber skidding.
16. Characteristics of professional and farming equipment of universal tractors for skidding (skidders) and specifics of their application in practice.
17. Special forestry wheeled skidders and tractors, their construction and application in choker and non-choker skidding of timber.
18. Technical parameters and technological application of machines equipped for non-choker skidding of timber by hauling: forwarders.
19. Combined ways of technological application of timber skidding equipment.
20. Principles of production preparation, pre- and post-felling adjustment of workplace in motor-manual felling and ground skidding. Significance of directional felling for the course of felling operations.
21. Power saw, its characteristics and ways of use in ordinary and specific conditions and in salvage felling (cutting, de-limbing and primary processing of logs).
22. Motor vehicles and trailers, logging truck-and-trailer units. Hydraulic cranes and loading winches.
23. Technology and organization of timber haulage on roads and railway. Transport systems. Basic principles of forestry technical logistics.
24. Causes and prevention of negative effects of the felling-transport process in forestry on forest environment (esp. on soil and trees).
25. Main representatives of the machinery used for planting stock production in forestry nurseries, their construction and technological applications; technical-economical parameters.

26. Systematics of technical means and technology for site preparation for natural and artificial regeneration of forest (clearing of felling residues, stumps, trees and undesirable advance growth from felled areas, soil preparation), their technical-economical parameters and aspects of their application in the process of forest regeneration.
27. Technology for artificial regeneration of forests (standard and progressive hand tools, planting machines and seed drills for forest regeneration), their technical-economical parameters and pro aspects of their application in the process of forest regeneration.
28. Technology for protection of young plantations and forest stands, differentiation of working processes according to the technology used; technical-economical parameters.
29. Technology for tending of young plantations and stands, differentiation of working processes according to the technology used; technical-economical parameters.
30. Work safety and hygiene during forestry machinery operation, general and special legislation, main rules of occupational safety and health during realization of the main activities within motor-manual production in forestry.

Forestry management

Economics in forestry and Forestry legislation

1. Forest and forestry, forest production
2. Forest enterprise, goals, forms and types
3. Property and capital of forest enterprise, structure, division
4. Long-term assets of a forest enterprise, purchasing, wear, use
5. Short-term assets of a forest enterprise
6. Human resources, productivity of labour
7. Costs and revenues of a forest enterprise, economic result
8. Financing of a forest enterprise, financial analysis
9. Wood-producing and non-wood-producing functions of the forest
10. Game management economics
11. Subject of accounting, financial, internal and managerial accounting
12. Accounting system, basic accounting tools
13. Closing of books and final accounts
14. Tax records
15. Tax system and taxes in forestry
16. Scheme of operations in forestry, primary recording

17. Subsidies in forestry sector from national sources and from the EU
18. Mission and objectives of EAFRD, OP Enterprise and Innovation, OP Environment, possibilities of obtaining financial means
19. Basic legal duties of forest owners during regeneration, tending and protection of forests
20. Legal means for securing professional level of forest management
21. Breach of forestry regulations, sanctions
22. State forest administration and its organization

Forest management

1. Current concept and subject matters of forest management, priorities, rules
2. Institutional and organizational assurance of forest management
3. Differentiation of natural environment, typological classification system of forests
4. Stand volume estimation methods
5. Management set of stands development, general forest management guidelines
6. General and detailed planning
7. Felling indicators
8. Calculation of the maximum allowable cut
9. Development of spatial arrangement of forests
10. Forest spatial arrangement units, their functions
11. Development of temporal arrangement of forests
12. Calculation of mean final increment and total current increment in a forest estate
13. Determination of value maturity
14. Special methods of forest state assessment
15. Enumeration survey offices – characteristics, organization
16. Special protection areas management plan – its contents and use
17. Forest management plan (FMP)
18. Forest management guideline (FMG)
19. Regional plan of forest development – its contents and use
20. Ways of contracting FMP and FMG elaboration
21. Procedure of FMP and FMG approval