

QUESTIONNAIRE FOR STRUCTURAL ANALYSIS PART 1

1. Structural mechanics, introduction. structural elements, type of structures, idealized structures, supports type, principles and preconditions, type of loads.
2. Analysis of elementary structures. Composition of internal forces diagrams. Reference and basic diagrams. Signs and position of the diagrams. Connection between shear and moment functions.
3. Kinematical analysis of structures. Determination of degrees of freedom. Basic kinematical elements and links, releases, basic structures.
4. Kinematical analysis of structures of cinematically stable structures. Typical ways for composing different stable structures. Kinematical analysis of compound beams.
5. Cinematically unstable systems. Common (fictitious) hinges. Common method for kinematical analysis of determinate structures – verification of kinematical stability. Kinematical theorems.
6. Structural analysis of three-hinged frames and three-hinged frames –support reactions, internal forces diagrams. Basics and reference diagrams. Joint equilibrium and composition of N-diagram.
7. Statically determinate complicated structures type I. Kinematical and structural analysis.
8. Principle of virtual work for rigid body. Principle of virtual work – definition. Usage of the principle of virtual work for determination of reactions or internal forces.
9. Influence line for statically determinate structures-definition. Path-line. Statical method for composing influence lines. Basic influence lines – influence lines at a simple beam and cantilever beam.
10. Application of the basic influence lines for compound beams and three-hinged frames.
11. Kinematical method for composing influence lines. The Müller Breslau Principle. work sequence for kinematical technique. Application for compound beams and three hinged frames.
12. Calculating of the internal forces and support reactions by using influence lines.
13. Displacements at a statically determinate structures. External work and strain energy. Principle of virtual work-definition. Energy theorem – Betti's theorem, Maxwell theorem, Theorem of the reciprocal reactions, theorem of the reciprocal reactions and displacement.
14. General expression of the displacement at a statically determinate structures from external load, thermal expansion and support settlement.
15. Statically indeterminate structures. Degrees of statical indeterminacy. Force method. Choice of a primary system. Compatibility equations.
16. Force method – physical method of the coefficients. Analysis from external force load.
17. Displacements at statically indeterminate structures from external load; thermal expansion and support settlement. Establish the modified expression for the displacement from external load, thermal expansion and support settlement.
18. Force method – analysis from, temperature load and support settlement.
19. Force method – analysis of symmetrical systems. Use of symmetry – couples unknown. Choice of symmetrical primary system.
20. Force method – analysis of systems including springs. Choice of primary system, full analysis.
21. Analysis of simple indeterminate structures using force method. Analysis from external force load and thermal expansion.
22. Analysis of simple indeterminate structures using force method. Analysis from unit support settlements. Stiffness matrix.
23. Displacement method for analysis of statically indeterminate structures. Idea of the method. Linear and rotational links. Primary system. Meaning of the equations and coefficients.
24. Displacement method – unit diagrams. Determination of the reactions at the additional links.
25. Displacement method –analysis from external load. Determination of the reactions at the additional links from external load.

26. Displacement method –analysis from temperature load and support settlements. Determination of the reactions at the additional links from external load.
27. Displacement method –analysis of system including springs.
28. Displacement method –analysis of system including rigid bodies.
29. Displacement method –analysis of system including symmetry. Choice of primary system. Couple unknowns.
30. Combined usage of displacement and force methods. Choice of primary system. Analysis of complicate structures.

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