Questions for self-control
1. Describe the situation and options when it makes sense to use subroutines and functions.
2. Give the comparative characteristic subroutine and function.
3. Get organized calling subroutines and functions.
4. What are the ways of transferring data between software units.
5. Explain what a list of options. Give rules for data transmission via the parameter list.
6. Explain what shared memory blocks. Give rules for data transmission through shared memory blocks.
7. Give the structure of program units.
8. Describe the types of broadcasting of program units.
9. Explain the use of modules. Describe the types of broadcasting modules.

Tasks for independent work
In the tasks, the following general information. Poisson's ratio for steel $\mu = 0,3$; modulus $E = 2 \cdot 105$ MPa.
The general formula for calculation is provided below:

1. The heat exchanger tube l = 0,6 m radius a = 0.08 m, thickness h = 0,0015 under the influence of uniformly distributed bending moment M0 = 0,22 N · m and pererizayuchoyi force at the end Q0 = 8 H . Determine the displacement and stress σx Wx outer surface of the tube at coordinates x = 0 ... l. To calculate the length l divided in 40 parts.

Calculation Wx, σx execute a subroutine; φ (βx), θ (βx), ξ (βx) calculate the sub-functions.
2. Tubular reactor is pressurized reagent P = 18 MPa. The diameter of the housing 2a = 0,18 m; length l = 1,75 m, wall thickness h = 0,00085 m. Determine the displacement U and bending moment M in 30 sections, evenly placed along the length l (the current coordinate x).

The variables U and M define the sub; φ (βx), θ (βx), ξ (βx) - take the form of functions.
3. Brief tubular shell length l = 0,18 m diameter 2a = 0,16 m, thickness h = 0,018 m is under external pressure P = 12 MPa. Determine the pipe walls W move in 21 point coordinates x, evenly placed along the length l.

χ1, χ2, χ3 defined as a function; W - a subroutine.
4. The cylindrical tube is under external pressure P = 20 MPa. Dimensions of pipes: radius a = 0,12 m, wall thickness h = 0,01 m. Determine the displacement W, Mx moment load and Qx in sections at a distance x = 0 ... l, where l = 0,5 m increments Δ x = 0,012 m.

φ (βx), ψ (βx), θ (βx) develop in the form of functions; power output values to draw a subroutine.
5. The case evaporating installation has the form of a cylindrical steel vessel diameter 2a = 0,82 m height l = 2,1 m, wall thickness h = 0,011 m. The density of the brine to install ρ = 1,3.103 kg / m3. Identify move W, moment M, force, acting in a circle, N, are developing at a distance x = 0 ... l increments Δx = 0,025 m in the case evaporating installation.

θ and ξ defined as a function, W, N, M - a subroutine.
6. Drying unit has a cylindrical portion diameter 2a = 1,3 m length l = 1,8 m, thickness h = 0,0125 m. The ends of the cylindrical portion pivotally mounted. Inside installation develops working pressure P = 2,5 MPa. Determine the displacement U and point M along the length of the cylindrical part (x = 0 ... l) increments Δx = 0,03 m.

Determine the value of the sub c1 and c2, and the value of ch and sh - vyznachyty a sub-function.
7. The cylindrical tank length l = 3 m radius a = 1,1 m, wall thickness h = 0,01 m loaded by Q0 = 5,1.103 H and moments M0 = 12,5 N · m, which are evenly distributed on the edges . Define Mx moment according to the coordinates x (x = 0 ... l) the length of the tank with the step Δx = 0,125 m.

To calculate c1, c2, c3 provide external functions, s0, s1, s2, s3 take the form of internal functions.
8. Ceramic ring length l = 0,6 m radius a = 0,25 m, thickness h = 0,006 m are in the scrubber cooling evenly distributed under the ends pererizuyuchoyi force Q0 = 8,2.103 N. modulus Ek = 6.104 MPa, Poisson's ratio μk = 0,2. Determine the displacement U and point M, which occur in the ring at a distance from the edge x (x = 0 ... l). Calculation fulfill increments Δx = 0,025 m.

The values of c1, c2, s1, s2 defined as a function, U and M to calculate a subroutine.
9. Determine deflection force Q and U in the case of the mill, made in the form of a hollow cylinder with a hinged edges if the pressure inside has weight P = 1,5 MPa. Geometrical dimensions: length l = 2,8 m radius a = 0,8 m, wall thickness h = 0,0085 m. Calculation fulfill increments Δx = 0,1 m in length (x = 0 ... l).

The values of c1, c2, c3, c4, s1, s2 defined as a function, U and Q define a subroutine.

10. A cylindrical adsorber (length l = 1 m, diameter 2a = 0,032 m steel wall thickness h = 0,009 m) evenly loaded socket point M0 = 12,6.103 N · m. Determine the distribution of deflections W and M points in the case adsorber at a distance from the end x (x = 0 ... l) increments Δx = 0,05 m.

The values of c1, c2, s1, s2 define a sub-function, W and M - the sub.