

Part I

1. Does a gyroplane have a rotary wing which rotates under the influence of a counterflow of air? Answers: 1) yes; 2) no.
2. Which part of a plane makes it move at the airport and is used for either a takeoff or landing without damage? Answers: 1) fuselage; 2) landing gear; 3) power unit.
3. Can we change the established flight path with the help of the vertical stabilizer? Answers: 1) yes, but only in a vertical plane; 2) no; 3) yes, but only in a horizontal plane.
4. What do you call a part of a wing which is necessary to increase lift? Answers: 1) aileron; 2) spoiler; 3) wing flap.
5. Where on the wing a wing slat is positioned? Answers: 1) on the leading edge; 2) on the trailing edge.
6. Look attentively at the Pic. I. How do you call a part marked with number 4? Answers: 1) wing flap; 2) wing slat; 3) spoiler; 4) aileron.

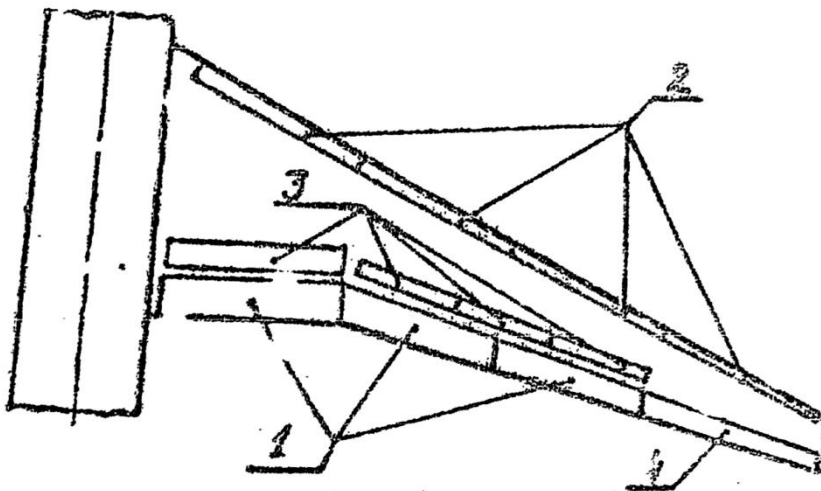


FIG. 1

7. Look attentively at the Pic. 2. How do you call a part marked with number 4? Answers: 1) main landing gear; 2) wing; 3) stabilizer; 4) fin.
8. Look attentively at the Pic. 2. How do you call a part marked with number 8? Answers: 1) stabilizer; 2) fin; 3) elevator; 4) rudder.

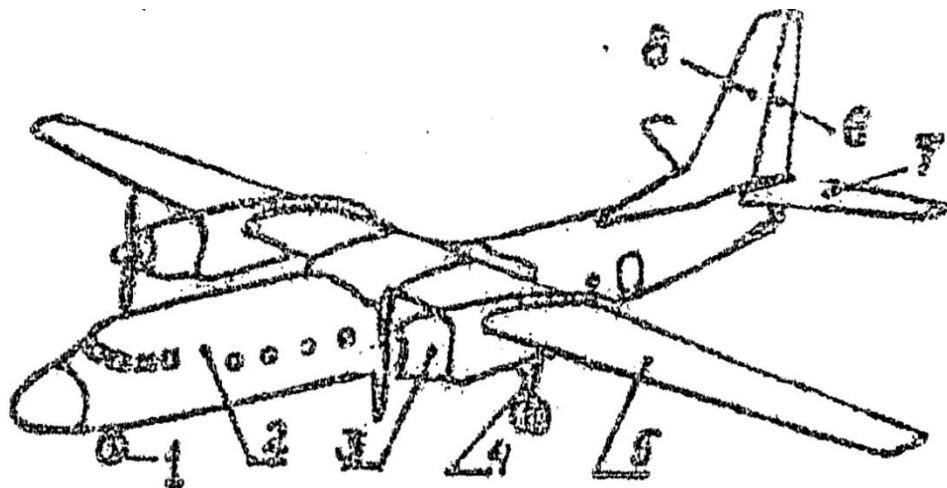


FIG. 2

9. How many wings does a monoplane have? Answers: 1) one wing; 2) two wings; 3) three wings.

10. How do you call a configuration without a horizontal stabilizer? Answers: 1) canard; 2) conventional; 3) tailless.

11. Look attentively at the Pic. 4. How do you call a part marked with number 2? Answers: 1) wing; 2) horizontal stabilizer; 3) vertical stabilizer.

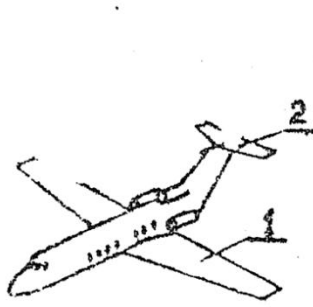


Рис. 3



Рис. 4

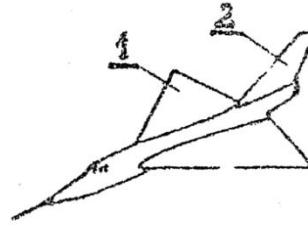


Рис. 5

12. What is the name of a line segment connecting two outermost points on the leading edge and trailing edge airfoil? Answers: 1) span; 2) chord; 3) thickness; 4) camber.

13. Complete the phrase: The ability of the air to return to its initial state with the discontinuation of the action of forces which have caused its deformation is called ... Answers: 1) viscosity; 2) compressibility; 3) resilience.

14. Which of the following is Bernoulli equation? Answers: 1) $\rho V F = const$; 2) $p + \frac{\rho V^2}{2} = const$

$$\rho + \frac{\rho V^2}{2} = const$$

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15. How do you call an aerodynamic moment relative to OX axis in the wind axis system? Answers: 1) yaw moment; 2) roll moment; 3) pitch moment.

16. What is the measure of aerodynamic coefficient C_x ? Answers: 1) kgf·m; 2) non-dimensional number; 3) kg; 4) m².

17. Is there a boundary level when air flows over the fuselage? Answers: 1) yes; 2) no.

18. Choose the correct characteristics of the turbulent boundary layer (TBL). Answers: 1) TBL is a calm condition without particles moving in the air flow; 2) TBL is a chaotic rotation with particles moving in the air flow.

19. Under what boundary layer (laminar or turbulent) of a wing its scrubbing drag will be higher? Answers: 1) laminar; 2) turbulent.

20. Which of the following formulas can help to calculate the aerodynamic efficiency? Answers: 1) $K = \frac{C_y}{C_x}$;

2) $K = \frac{C_x}{C_y}$

21. What is typical for the best angle of attack of a wing? Answers: 1) air flow imbalance from the entire wing surface; 2) aerodynamic efficiency reaches its maximum value; 3) the drag is minimal.

22. What do you call the point of application of a vector of a wing total aerodynamic force? Answers: 1) wing aerodynamic center; 2) wing pressure center.

23. How does a position of the wing aerodynamic center change with transition from subsonic to supersonic speed? Answers: 1) center does not change its position; 2) center shifts forward; 3) center shifts backward.

24. (*) Complete the phrase: How do you call a dependency diagram of coefficients C_y и QUOTE C_x on the angle of attack? _____(polar)

25. What is the condition of the horizontal flight of a plane? Answers: 1) $G=Y$; 2) $Q = P$.

26. Complete the phrase: The maximum usable altitude of an aircraft is called ... Answers: 1) ceiling; 2) range of coverage.

27. Complete the phrase: A minimal speed of a plane is characterized by: Answers: 1) $C_y=C_{y\max}$; 2) $K=K_{\max}$; 3) $C_x=C_{x\min}$.

28. Look attentively at Pic. 24. What do you call a part of the flight trajectory marked with number 1? Answers: 1) gliding; 2) flattening; 3) floating; 4) running-on.

29. Look attentively at Pic. 24. What do you call a part of the flight trajectory marked with number 2? Answers: 1) gliding; 2) flattening; 3) floating; 4) running-on.



Рис. 24

30. Look attentively at Pic. 24. What do you call a part of the flight trajectory marked with number 3? Answers: 1) gliding; 2) flattening; 3) floating; 4) running-on.

31. Complete the phrase: Balancing of the moments of all forces acting on the plane relative to its center of gravity is called ... Answers: 1) stability; 2) controllability; 3) balance.

32. Under which mutual position of the center of gravity and the center of a plane the position is neutral? Answers: 1) the center is behind the center of gravity; 2) the center is in front of the center of gravity; 3) the center coincides the center of gravity.

33. Will the plane have longitudinal equilibrium if its center is in front of the center of gravity? Answers: 1) yes; 2) no.

34. How do you call a stabilizer of a plane which provides balancing, direction stability and controllability? Answers: 1) vertical stabilizer; 2) horizontal stabilizer.

35. How does a plane move if the right aileron is pushed up and the left aileron is pushed down? Answers: 1) shift to the right; 2) shift to the left.

36. How do you call the ability of a material or a construction to resist destruction under a single loading? Answers: 1) rigidity; 2) strength; 3) durability; 4) endurance.

37. How do you call the ability of a material or a construction to retain deformation after removing a load? Answers: 1) resilience; 2) flexibility; 3) corrosion; 4) endurance.

38. How do you call the ability of a material or a construction to recover its original appearance after removing a load? Answers: 1) resilience; 2) flexibility; 3) corrosion; 4) endurance.

39. How do you call the ability of a material or a construction to retain deformation after removing a load? Answers: 1) resilience; 2) flexibility; 3) corrosion; 4) endurance.

40. If a wing bends upward, will the upper surface of a wing be stretched? Answers: 1) yes; 2) no.

41. Is a spar an element of a wing main frame? Answers: 1) yes, a spar is longitudinal element of a wing main frame; 2) no, a spar is not an element of a wing main frame; 3) yes, a spar is a lateral element of a wing main frame

42. Is cover an element of a wing main frame? Answers: 1) yes, cover is a longitudinal element of a wing main frame; 2) no, cover is not an element of a wing main frame; 3) yes, cover is a lateral element of a wing main frame.

43. How do you call self-induced flexible response of certain airplane units occurring during a flight? Answers: 1) reverse; 2) flutter; 3) buffeting.

44. What is the movement of a plane if we move the control wheel forward towards ourselves? Answers: 1) ascending; 2) descending; 3) turning to the left; 4) turning to the right.

45. Complete the phrase: A structural system of a fuselage where fuselage has its skin holding the skeleton structure together is called ... Answers: 1) truss fuselage; 2) spar; 3) monocoque fuselage.

46. Which of the following elements make up a beam-type fuselage? Answers: 1) spar; 2) stringers; 3) frames.

47. Which of the following elements give fuselage its cross-sectional form? Answers: 1) spar; 2) stringers; 3) frames.

48. Are the frames in the construction of a stringer fuselage? Answers: 1) yes; 2) no.

49. Complete the phrase: If a bending moment is mainly associated with spar caps, this is ... Answers: 1) spar construction; 2) thru-wing construction.

50. Which element of a wing transfers the aerodynamic load to the spa caps? Answers: 1) stringers; 2) cover; 3) rib.

Part II

1. Classification of aircraft by principles of a flight.
2. The structure of aircraft and the purpose of the elements.
3. Engineering materials for making aircraft and the fields of application.
4. General requirements to the construction of aircraft and assessment criteria.
5. Aerodynamic characteristics of a wing at subsonic, transonic, supersonic and sonic speed.
6. Engineering of spar, torsion box, and thru-wing constructions of a wing and stabilizer.
7. Engineering of aircraft units and the functions of their elements. General requirements to the aircraft.
8. Construction and power diagrams of aircraft units.
9. Aerodynamic characteristics. Polar diagram. Aerodynamic property.
10. The area of existence of an aircraft operation.
11. Aircraft gross weight. The equation of existence of an aircraft.
12. The wing of a plane. The function of the wing. The shape of the wing in plan view. The position of the wing relative to the fuselage axis.
13. Fuselage of the plane. The functions of the fuselage.
13. Landing gear. The functions of the landing gear.
14. The main construction and power diagrams of the wing.
15. The main construction and power diagrams of the fuselage.
16. The main power elements of the wing.
17. The fundamentals of aircraft making. The main stages of aircraft making.
18. Aerodynamic structures of an aircraft.
19. The main engineering materials.