Exam questions on discipline: Nuclear astrophysics

Part (Блок) № 1

1. To write down the complete density of energy and energy falling on one baryon in terms of concentration of baryons
2. To write down the expression for a quantity of heat received in terms of one baryon
3. To write down an equilibrium condition in an element of Wednesday through warmth and entropy, falling on one baryon
4. To write down the first law of thermodynamics through the energy falling on one baryon, and concentration of baryons
5. To give values for weight and the radius of the Sun; to give the reference values for masses and the sizes of neutron stars, white dwarfs and black holes in mass units and the extent of the Sun; to give the range of values of mass of stars - predecessors of compact stars (in Sun mass units)
6. To write down dependence of warmth of dQ in an element of Wednesday from temperature of T and ds – an entropy on one baryon
7. To write down for an environment element in equilibrium the equation for the energy falling on one baryon depending on pressure, volume (falling on one baryon) and temperature
8. To write down for an environment element in equilibrium the equation for the energy falling on one baryon depending on pressure, concentration of particles of a grade of i and their chemical potential, and temperature
9. To write down a differential equation of dependence of pressure and temperature on density of number of baryons
10. To write down a differential equation of dependence of chemical potential on density of number of particles of a grade of i
11. To write down reactions of an electron capture and to offer an explanation of course of such reactions in superdense environments (crystals)
12. To write down a formula for the free energy counting on one baryon
13. Cumulative distribution function of particles in case of Fermi statisticians and in a case to Bosa statisticians
14. To write down relativistic parameter in terms of an impulse of Fermi
15. To write down density of electrons through Fermi impulse for a degenerate electronic Fermi liquid

Part (Блок) №2

16. To express density of electrons of a degenerate electronic Fermi liquid through relativistic parameter.
17. To write down expression for pressure of a degenerate electronic Fermi liquid in the form of integral on impulses of electrons.
18. To give values for weight and the radius of the Sun; to give the reference values for masses and the sizes of neutron stars, white dwarfs and black holes in mass units and the extent of the Sun; to give the range of values of mass of stars - predecessors of compact stars (in Sun mass units)

19. To write down reactions of an electron capture and to offer an explanation of course of such reactions in superdense environments (crystals)
20. Cumulative distribution function of particles in case of Fermi statisticians and in a case to Bosa statisticians
21. To write down expression for substance density through the mass of ions and density of their number
22. Substance equation of state in the form of a polytrope in case of nonrelativistic electrons
23. Substance equation of state in the form of a polytrope in case of relativistic electrons
24. Substance equation of state in the form of a polytrope in case of nonrelativistic neutrons
25. Substance equation of state in the form of a polytrope in case of relativistic neutrons
26. To write down the approximate relation of Coulomb energy to thermal energy for an undegenerate gas, to offer an explanation for this relation
27. To write down the approximate relation of Coulomb energy to thermal energy for degenerate gas, to offer an explanation for this relation
28. Reactions of the inverse beta decay (reaction of an electron capture in superdense environments)
29. Compact stars: origin, types and data of astrophysical supervision
30. White dwarfs: main characteristics, values of masses, communication of a brightness of stars with their characteristics; internal structure
31. White dwarfs: element structure, filing methods, spectral characteristics
32. White dwarfs: the reference reactions in a gas envelope and a solid core

Part (Блок) №3

33. Black holes: Chandrasekar's limit, methods of filing of black holes
34. Neutron stars: versions, methods of supervision
35. Neutron stars: pulsars, glitches
36. Neutron stars: microstructure pulsarnykh of impulses
37. Double systems: neutron star and routine gas star, substance accretion phenomenon
38. White dwarfs: the reference reactions in a gas envelope and a solid core
39. Neutron stars: versions, methods of supervision
40. Reactions of the inverse beta decay (reaction of an electron capture in superdense environments)
41. Double systems: black hole and routine gas star, substance accretion phenomenon
42. Double systems: neutron star and white dwarf, methods of filing and data of supervision
43. Brown dwarfs: main characteristics, methods and data of supervision
44. Red dwarfs: main characteristics, methods and data of supervision
45. Types of the main forces: comparative characteristics, intensity and radiuses of action
46. Weak couplings – their role in evolution of the Universe and formation of substance
47. The strong couplings - their role in evolution of the Universe and formation of a matter
48. Electromagnetic forces – their role in formation of structures, atoms and molecules
49. Quantum chromodynamics – their role in formation of kernels
50. The strange and kvarkovy stars – their main characteristics and properties
51. Primary stage of evolution of the Universe – a role of the strong and weak forces
52. Primary stage of development of the Universe – a role of electromagnetic and gravitational forces in formation of structures

53. Relict electromagnetic radiation, data of supervision and theory of the phenomenon
54. Relict neutrino radiation, data of supervision and theory of the phenomenon
55. Dark matter – data of supervision, the main questions and problems
56. Dark energy – data of supervision, problems and assumptions
57. Nuclear reactions in gas stars, basis cycles of reactions
58. Primary nucleosynthesis – the main reactions
59. Problem of "a lithium failure" in abundance of chemical elements
60. The theory of a nucleosynthesis – formation of mild and average elements
61. The theory of a nucleosynthesis – formation of heavy elements in explosions supernew