18. "ATOMIC AND NULEAR PHYSICS"

Sr.	Statements	A	B	C	D
1	Isotopes are atoms of same element with different:	atomic mass	atomic number	protons	electrons
2	One of the isotopes of uranium is $^{238}_{92}U$. The number of neutrons in this isotopes are:	92	146	238	330
3	Which among the following radiation has more penetrating power?	beta particle	alpha particle	gamma ray	all have same penetration
4	What happens to the atomic number of an element which emits one alpha particle?	increases by 1	stays the same	decreases by 2	decreases by 1
5	The half-life of a certain isotope is 1 day. What is the quantity of the isotope after 2 days?	one half	one quarter	one eighth	none of these
6	When Uranium (92 protons) ejects a beta particle, how many protons are left in the nucleus?	89 protons	90 protons	91 protons	93 protons
7	Release of energy by sun is due to:	nuclear fission	nuclear fusion	burning of gases	chemical reaction
8	When a heavy nucleus splits into two lighter nuclei, the process would:	release nuclear energy	absorb nuclear energy	release chemical energy	absorb chemical energy
9	Proton is heavier than electron:	1636 times	1736 times	1836 times	1936 times
10	Atomic mass number can be found by relation:	Z-A	A+N	Z+N	Z+A
11	The number of neutrons in tritium is:	0	1	2	3
12	Number of isotopes of hydrogen:	1	2	3	4
13	A helium nuclei formed if ____ hydrogen atoms combine?	1	2	3	4
14	Beta particle is actually:	neutron	positron	electron	proton
15	Alpha particles are:	electrons	protons	neutrons	helium nuclei
16	Radiations present in atmosphere due to different radioactive substances are called:	cosmic radiations	background radiations	alpha radiations	beta radiations
17	In α-decay, decrease in atomic no. __ & mass no.__	2,1	4,2	2,2	2,4
18	Safe limit of radiation in exposure is ___ per year.	4 rem	6 rem	5 rem	3 rem
19	α-particles passing through a gas produce:	evaporation	ionization	excitation	all of these
20	The rays used during brain radio therapy are:	alpha	beta	gamma	X-rays
21	Number of neutrons in plutonium $^{242}_{92}Pu$?	92	142	150	242
22	To diagnose the brain-tumor, it is used:	Iodine-131	Phosphorus-32	Cobalt-60	Carbon-14
23	Which one of the three decay processes results in a new element?	only α	only β	only γ	α and β
24	During fission of 1 kg of U-235, energy released is:	$67×10^{10}$ J	$65×10^8$ J	$60×10^8$ J	$66×10^9$ J
25	No. of neutrons during emission of fission reaction:	2	3	4	5
26	What type of nuclear decay leaves the number of protons and neutrons unchanged?	alpha decay	beta decay	gamma decay	both A & B
27	What type of nuclear decay most often produces the greatest mass and charge loss?	alpha decay	beta decay	gamma decay	both B & C
28	$^{214}_{84}Po$ undergoes α-decay to produce a daughter nucleus that itself undergoes β-decay Which one of the following nuclei is the one that ultimately results?	$^{211}_{82}Pb$	$^{215}_{80}Hg$	$^{211}_{81}Tl$	$^{212}_{83}Bi$
29	Radium-226 decays by emitting alpha particle. What is the daughter nucleus?	Rd	Rn	Bi	Pb

30	The temperature of sun is:	20million Kelvin	2 million Kelvin	2 million Kelvin	None
31	$^{39}_{18}$Ar is an isotope with a half-life of 269 years. It will reduce to half in:	134.5 min	134.5 years	269 min	269 years
32	A sample starts with 1000 radioactive atoms. How many half-lives have elapsed when 750 atoms have decayed?	0.25	1.5	2.0	2.5
33	Origin of energy from the sun and stars is:	fission	fusion	carbon dating	radioactivity
34	One of the isotopes of uranium is U-239 having atomic number 92. Its nucleon number is:	239	331	92	147
35	When β-rays are emitted, the nuclear mass:	decreases by 4 units	does not change	increases by 2 units	increases by 1 unit
36	Which particle has large range in air?	α-particles	β-particles	γ-particles	neutrons
37	Gamma rays from cobalt-60 are used for the treatment of:	circulation of blood	cancer	heart attack	thyroid glands
38	Which of these will be absorbed by the paper?	α-particles	β-particles	γ-particles	neutrons
39	If half-life of a radioactive element is one year, percentage of sample decay after two years is:	50%	75%	25%	2%
40	The ionization power of α-particles is:	equal to β-particle	equal to γ-particle	greater than β-particle	less than β-particle
41	In the reaction $X + {}^{17}_{8}O \rightarrow {}^{14}_{7}N + {}^{4}_{2}He, X$ is?	$^{1}_{1}H$	$^{2}_{1}H$	$^{1}_{0}n$	$^{0}_{-1}e$

"Important Short Questions"

1) What is the difference between atomic number and atomic mass number?
2) Define isotopes. Also write the names of isotopes of Hydrogen.
3) What is common in isotopes of an element and what is different in them?
4) Different isotopes of a given element have different masses but they have the same chemical properties. Explain why chemical properties are unaffected by a change of isotope.
5) The atomic number of one particular isotope is equal to its mass number. Which isotope is it?
6) What do you mean by term radioactivity? Why some elements are radioactive but some are not?
7) What is the unit of radioactivity?
8) What are the properties of radiation which are emitted from radioactive elements?
9) What are cosmic radiations?
10) How can you make radioactive elements artificially? Describe with a suitable example.
11) Define nuclear transmutation?
12) Which is more likely to expose, a film kept in a cardboard box, α- particles or β-particles?
13) Write the alpha decay process of $^{234}_{91}$Pa.
14) It is possible for a form of heavy hydrogen to decay by emitting an alpha particle? Explain.
15) It happens that a nuclear radiation emits from an atom of an element, it moves one step ahead in the periodic table? Explain. **OR** Can atomic number increase during nuclear decay? Justify with example.
16) β-particle is emitted from the neutron of the nucleus. Write nuclear equation for this reaction.
17) Why range of β-particle is greater than α-particle in air with same energy?
18) Why ionization power of α-particle is greater than β-particle in solid with same energy?
19) What is meant by penetration power? Which rays have highest penetration?
20) What do you understand by half-life of a radioactive element?
21) What fraction of a radioactive sample has decayed after two half-lives have elapsed?
22) What is difference between stable and unstable nuclei?
23) Justify that radioactivity is a spontaneous process.
24) What is meant by background radiations? Enlist some sources of background radiations.
25) Describe two uses of radio-isotopes in medicine, industry or research.
26) What do you mean by carbon dating? How can the scientist estimate died tree age by C-14?
27) Can Carbon-14 dating give the age of fossil dinosaur skeletons? Explain.

28) What are common radiation hazards? Briefly describe the precautions to prevent from them.
29) Is it possible for an element to have different types of atoms? Explain.
30) Which nuclear reaction would release more energy?
31) Define controlled chain reaction.
32) What is the difference between fission and fusion reaction?
33) Why is energy released when lighter nuclei fuse with heavier nuclei?
34) What is meant by radioactive tracers? How these are useful?
35) Which has more penetration power, alpha particle or gamma ray photon?
36) Some food is treated with gamma radiation to kill bacteria. Why is there not a concern that people who eat such food might be consuming food containing gamma radiation?
37) Radioactive α - emitters are relatively harmless outside the body, but can be dangerous if ingested or inhaled. Explain.
38) What is the difference between natural and artificial radioactivity?
39) Why nuclei of atoms with atomic number greater than 82 emit radiations?
40) If nuclear radiation is harmful, how it can be used for treatment of diseases?
41) How long would likely have to wait to watch any sample of radioactive atoms completely decay?
42) How much of a 1g sample of pure radioactive matter would be left un-decayed after four half-lives? **OR** What fraction of a radioactive element will be left after 4 half-lives have elapsed?
43) In the nuclear reaction $^A_Z X + ^4_2 He \rightarrow ^{A+3}_{Z+2} Y + W$, what particle does W denote?
44) When a nucleus $^{238}_{92} U$ absorbs a slow neutron, it subsequently emits two α-particles. What is the resulting element?

"Important Long Questions"

1) Write applications of radioisotopes in medicine, industry and agriculture.
2) What do you understand by half-life of a radioactive element? Explain by graph.
3) What is nuclear transmutations? Discuss nuclear decays in detail.
4) What is nuclear fission and nuclear fusion?
5) What are hazards and safety measures of radiation?