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Sardar Patel University, Vallabh Vidyanagar
B.Sc. [Semester- VI]
Subject Physics Course Code No: US06CPHY03
Subject/Course Title: Nuclear Physics

Date: 01 - 4 - 2016
Friday,

Time: 2:30 pm to 5:30 pm
Total Marks-70

INSTRUCTIONS:

- 1 Attempt all questions.
- 2 The symbols have their usual meaning.
- 3 Figures to the right indicate full marks.

Q-1 Multiple Choice Questions: [Attempt all]

10

- (1) Mass of μ meson is
(a) two times mass of electron (b) 20.7 times mass of electron
(c) 207 times mass of electron (d) 2007 times mass of electron
- (2) Charged particle moving along to Magnetic field experiences
(a) No force (b) Maximum force
(c) perpendicular force (d) opposite force
- (3) For an exoergic nuclear reaction value of Q is
(a) Negative (b) Positive
(c) Zero (d) none of above
- (4) Energy required for emission of a neutron from a nucleus is
(a) 8 MeV (b) 2 MeV
(c) 4 MeV (d) 24 MeV
- (5) Value of 'g' factor for proton is
(a) 1.668×10^{-27} Kg (b) 1.6×10^{-6} Coulomb
(c) 9.8 m/sec^2 (d) 5.56
- (6) Which isotope of Uranium is produced by a Breeder Reactor?
(a) U^{235} (b) U^{233}
(c) U^{236} (d) U^{237}
- (7) Which of the following is an accelerator?
(a) Drift tube Linac (b) GM counter
(c) Spark chamber (d) Proportional counter
- (8) What is required to detect path of a charged particle?
(a) GM counter (b) Spark chamber
(c) Scintillation Counter (d) Cockcroft generator
- (9) Van de Graaff generator is _____
(a) an accelerator (b) a detector
(c) an ionization chamber (d) a scintillator
- (10) Typical life span of compound nucleus is
(a) 10^{-16} Sec (b) 10^{-22} Sec
(c) 10^{35} Sec (d) 10^{22} Sec

Q-2	Answer any ten questions in short.	20
(1)	What information is obtained by mesonic x ray method? How?	
(2)	With help of nuclear spin show that electron can't exist in a nucleus.	
(3)	Define Isotops, Isobars, Isomers and Isotones.	
(4)	Why emission of nutron from the nucleus is least probable?	
(5)	Why surface nucleons reduces the Binding Energy?	
(6)	Why nuclei lying above or below line of stability are radio active?	
(7)	Discuss the emission of delayed neutron.	
(8)	Explain time of flight method for measuring fission fragment energy.	
(9)	Explain use of radio isotopes in therapy	
(10)	What is recovery time of GM counter	
(11)	Principle of Bubble chamber	
(12)	Working of drift tube linac	
Q-3	(a) Write a note on binding energy of nucleus	06
	(b) Discuss the statistics of nucleus.	04
	OR	
Q-3	(a) Explain electron scattering method for measurement of nuclear radius.	06
	(b) Discuss nuclear magnetic moment.	04
Q-4	(a) Discuss variation of binding energy (B/A) as a function of Atomic mass number (A).	06
	(b) Discuss potential barrier associated with symmetric fission.	04
	OR	
Q-4	(a) Derive Q equation and solve it for threshold energy of projectile.	06
	(b) Write a note on Compound nuclear reaction.	04
Q-5	(a) Derive four factor formula for fission chain reaction	06
	(b) Explain enrichment of Uranium.	04
	OR	
Q-5	(a) Discuss theory of NMR	05
	(b) Discuss use of isotopes in archeology.	05
Q-6	(a) Discuss principle and working of GM Counter	10
	OR	
Q-6	(a) Discuss principle and working of gas filled ionization chamber.	10

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