C. U. SHAH UNIVERSITY Summer Examination-2022

Subject Name : Nuclear and Particle Physics

Subject Code : 5SC03NPP1		Branch: M.Sc. (Physics)	
Semester: 3	Date: 22/04/2022	Time: 02:30 To 05:30	Marks: 70

Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

SECTION – I

Q-1		Attempt the Following questions (1 Mark *7=7)	(07)
	a	List the constituents of nucleus.	01
	b	Explain Rutherford's experiment.	01
	c	Find radius of ⁶⁴ Cu nucleus using electron diffraction.	01
	d	Find radius of ⁵⁶ Fe nucleus using electron diffraction.	01
	e	Write Geiger-Nuttall Law.	01
	f	Explain Alpha Decay and give equation of it.	01
	g	What is beta decay and name its three nuclear equations.	01
Q-2		Attempt all questions	(14)
L.	a	Write a note on constituents of nucleus and their properties.	07
	b	Explain with necessary formulation about measurement of nuclear radius.	07
		OR	
Q-2		Attempt all questions	(14)
-	a	Explain in detail Alpha spectrum and fine structure.	07
	b	Write a note on Alpha decay paradox.	07
Q-3		Attempt all questions	(14)
L.	a	Write a note on continuous beta decay spectrum.	07
	b	Explain in detail Pauli's neutrino hypothesis.	07
		OR	
Q-3			

Explain in detail Fermi's theory of beta decay. 14



		SECTION – II	
Q-4		Attempt the Following questions (1 Mark *7=7)	(07)
	a.	List the fundamental forces.	01
	b.	Give the list of magic numbers.	01
	c.	Name the members of Meson family.	01
	d.	Mesons and Baryons made of how many quarks?	01
	e.	List the members of lepton family & what is lepton number for Baryon?	01
	f.	What is the value of strangeness for Kaons and nucleons?	01
	g.	State the CPT theorem.	01
Q-5			(14)
-		Give brief description of liquid drop model and derive SEMF.	
		OR	
Q-5		Attempt all questions	
	a	Explain mass parabola for even nuclei.	07
	b	Write a detailed note on fundamental forces.	07
Q-6		Attempt all questions	(14)
	a	Write a note on mass parabola for odd nuclei.	06
	b	Find Spin and parity of following nuclei. ⁵⁷ Fe, ⁶ Li, ¹⁵ O, ⁴⁰ Ca, ¹⁴ C, ¹⁴ N, ⁴⁶ Ti, ⁶⁴ Cu	08
		OR	
Q-6		Attempt all Questions	
	a	Write a note on quarks.	07
	b	Explain the classification of the elementary particles in detail.	07

