YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
M.SC (PHYSICS) SEM-II EXAMINATION
NUCLEAR AND PARTICLE PHYSICS (PH- 506) (Reappear)

Time: 3 Hours   Max. Marks:60

Note: 1. It is compulsory to answer the questions of Part -A. Limit your answers within 20-40 words in this part.
2. Answer any four questions from Part -B in detail.
3. Different parts of the same question are to be attempted adjacent to each other.

PART -A

Q1	(a)	Define nuclear cross section. What is the unit of nuclear cross section?	(2)
	(b)	Explain the Geiger Nuttal law of α-decay.	(2)
	(c)	What do understand by internal conversion?	(2)
	(d)	Define Straggling and Range.	(2)
	(e)	Explain the three modes of β-Decay.	(2)
	(f)	Give one example each of Photo disintegration and Radiative capture.	(2)
	(g)	Explain neutrino hypothesis.	(2)
	(h)	Give two examples of (α,p) reactions.	(2)
	(i)	Why is beta ray spectrum continuous?	(2)
	(j)	How can you measure the energy of α-rays?	(2)

PART – B

Q2	(a)	What happens when an Alpha particle moves through matter? Hence derive the expression for its stopping power.	(5)
	(b)	Explain any one method of interaction of Gamma Rays with matter.	(5)
Q3	(a)	Describe the construction and working of a Cerenkov detector.	(5)
	(b)	Derive an expression for the Q - value of nuclear reaction. Also state the significance of +ve and –ve Q-value.	(5)
Q4	(a)	A proton whose path has a radius of curvature of 250cm in a magnetic field of 1 Tesla traverses a lead plate whose thickness is $40 gm/cm^2$ along the path of the proton. What should be the radius of curvature after it emerges from the plate?	(5)
	(b)	Explain in detail the compound nucleus theory.	(5)
Q5	(a)	Explain the α-decay paradox. Discuss the quantum mechanical theory of α-decay and obtain a relation for barrier penetrability.	(5)
	(b)	Why is Deuteron a loosely bound structure? Explain.	(5)
Q6	(a)	In an absorption experiment with 1.14 MeV Gamma radiation from ^{65}Zn, it is found that 25 cm of Al reduces the beam intensity to 2%. Calculate the half value thickness.	(5)
	(b)	Define continuum. Hence explain the continuum theory of nuclear reaction.	(5)
Q7		Write short notes on:	(5)
	(a)	Briet-Wigner dispersion formula	(5)
	(b)	n-p scattering	