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**GIET UNIVERSITY, GUNUPUR – 765022**  
M. Sc (Second Semester) Examinations, July – 2023  
**22PHPC202- Basic Nuclear Physics**  
**(Physics)**

Time: 3 hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

**PART – A****(2 x 10 = 20 Marks)**Q.1. Answer *ALL* questions

	CO #	Blooms Level
a. Mention the value of magnetic moment and quadrupole moment of deuteron	CO 1	K1
b. State the relation between nuclear radius and binding energy with one example.	CO 1	K2
c. Define isospin with suitable examples.	CO 1	K1
d. What is scattering length?	CO 2	K2
e. Mention Yukawa' potential and find the mass of a meson.	CO 2	K1
f. Write Semi-empirical mass formula.	CO 3	K1
g. Discuss nuclear fusion with an example.	CO 3	K2
h. Define a compound nucleus with examples.	CO 3	K1
i. Find out the Spin-parity value of ${}_6\text{C}^{13}$ and ${}_{12}\text{Mg}^{24}$	CO 4	K2
j. Plot the necessary graph to show Schmidt lines.	CO 4	K2

**PART – B****(10 x 5 = 50 Marks)**Answer ANY FIVE questions

	Marks	CO #	Blooms Level
2. a. Define mass defect and binding energy of a nucleus. Give one example.	7	CO 1	K2
b. Explain the angular momentum of the nucleus	3	CO 1	K2
3.a. Write the ground state properties of the deuteron.	4	CO 1	K1
b. How these properties suggest that the two nucleon interaction has a tensor component?	6	CO 1	K2
4. a. Explain Effective range theory.	6	CO 2	K2
b. Discuss Yukawa's meson theory.	4	CO 2	K2
5.a. Discuss n-p scattering	2	CO 2	K1
b. Obtain Breit-Wigner formula for S-wave. Discuss the different cases.	8	CO 2	K2
6. a. Write a short note on Liquid drop model.	4	CO 3	K1
b. Explain Bohr-Wheeler theory of fission.	6	CO 3	K2
7.a. What are magic numbers? Why they were named so?	4	CO 4	K1
b. Draw the energy level diagram showing all magic numbers as followed by shell model	6	CO 4	K2
8. a. Mention the success and failures of single particle shell model.	4	CO 4	K1
b. Discuss briefly about the nuclear model as stated by Bohr-Mottelson.	6	CO 4	K2

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