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GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (Second Semester) Examinations, September – 2021

20PHPC202 – Basic Nuclear Physics

(Physics)

Time: 2 hrs

Maximum: 50 Marks

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

PART – A

Q.1. Answer *ALL* questions

(2 x 10 = 20 Marks)

- a. How nuclear radius and binding energy related to a mass number is, explain with one example.
- b. Write the magnetic moment and quadrupole moment of deuteron.
- c. Define Parity and isospin with suitable examples
- d. What is scattering length?
- e. What is Yukawa theory of nuclear force? Find the mass of a meson.
- f. What are different types of nuclear reactions?
- g. What is nuclear fusion? Give one example
- h. What is a compound nucleus?
- i. Find out the Spin-parity value of ${}^8\text{O}^{16}$.
- j. What do you mean by Schmidt lines?

PART – B (6 x 5 = 30 Marks)

Answer ANY FIVE of the questions

Marks

2. Define mass defect and binding energy of nucleus. Explain the graph between binding energy and mass number. (6)
3. Write the ground state properties of the deuteron. How these properties suggest that the two nucleon interaction has a tensor component? (6)
4. Explain Effective range theory. (6)
5. Discuss n-p scattering. Obtain Breit-Wigner formula for S-wave. (6)
6. Write a short notes on: (6)
 - (i) Liquid drop model.
 - (ii) Bohr-Wheeler theory of fission
7. Define the magic numbers with properties of nuclei. Draw the energy level diagram showing all magic numbers as followed by shell model (6)
8. Derive the nuclear model as stated by Bohr-Mottelson. (6)

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