M.Sc. (Physics) Third Semester Old

MSc23102 - Compulsory - Nuclear and Particle Physics-I Paper-II

P. Pages : 1 **GUG/W/18/2301**

Time : Three Hours * 1 7 9 5 * Max. Marks : 80

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1. Either

a) Explain size, shape, charge distributors, Spin and parity of nucleus. **8**

b) Explain nuclear mats and binding energy of nucleus. **8**

OR

e) What is mean by magnetic and electric quadrupole moment? Explain it. **8**

f) Discuss molecular beam resonance method in detail. Draw a suitable diagram. **8**

2. Either

a) Describe liquid drop model of nucleus and process of nuclear fission. **8**

b) Explain electromagnetic properties of even -even and odd deformed nucleus and discuss its relation. **8**

OR

e) Describe collective model of nucleus of Bohr- Mottelson, How they have shown electromagnetic excitation with accelerated ions. **8**

f) Determine wave functions of the nucleus in single particle operator and their expectation values. **8**

3. Either

a) Explain direct and compound nuclear reaction mechanisms. **8**

b) Explain Fermi theory of beta decay. Give its importance in nuclear transmutation reactions. **8**

OR

e) Derive Brelt- Wigner resonance formula for continuous probability density function. **8**

f) Define Isomerism. Explain nuclear isomerism for a predominant decay mode. **8**

4. Either

a) Explain the working of thermal reactor with suitable diagram. **8**

b) Discuss thermonuclear reactions. What is the role of temperature in the thermonuclear reaction. **8**

OR

e) Explain the principle and working of dual purpose nuclear reaction. What is the role of fast and thermal neutrons in it function. **8**

f) How do stars generate their light and heat energy describe the process. **8**

5. Answer all the followings.

a) Explain optical model of nucleon- nucleon interaction. **4**

b) Discuss angular momenta and parities of nuclear ground state. **4**

c) Write on Gamma decay. **4**

d) Write a note on role of coolants. **4**

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