



M.Sc. III Semester Degree Examination, April/May - 2023

CHEMISTRY

Nuclear Chemistry and Materials Science

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Question **No. 1 (Q1)** is **Compulsory**, each question carries **equal** marks.

1. (a) Explain Mass defect and binding energy. **4+5+5**
(b) Explain Nuclear model based on Fermi Gas Model.
(c) Discuss the principle and working of Scintillation counter in radioactivity measurements.

2. (a) What are nuclear reactions ? Explain its types with reactions. **4+5+5**
(b) Write a note on nuclear waste management.
(c) Describe thermonuclear reactions with examples.

3. (a) Give Pauling's rules. How it will help in structural determination. **4+5+5**
(b) Discuss the factors influencing the rate of phase transitions.
(c) What are imperfections in solids ? Explain point defect and plane defect in solids.

4. (a) Explain band theory of solids with examples. **4+5+5**
(b) Explain the effect of temperature on different types of magnets.
(c) Give the applications of semiconductors.

5. (a) Explain types of Luminescence with example. **4+5+5**
(b) Explain the construction and working of Ruby laser.
(c) What are super conductors ? Give their properties and applications.



6. (a) Discuss : 4+5+5
(i) Anisotropy in crystals.
(ii) Point defects and plane defects in solids.
- (b) Give analytical applications of nuclear chemistry.
- (c) Write brief notes on :
(i) Photonuclear reactions
(ii) Specific nuclear reactions
7. (a) Explain the band theory of solids. 4+5+5
(b) Explain the conduction mechanism in doped polyparaphenylene.
(c) Discuss the construction and working of Neodium lasers.
8. (a) Discuss : 4+5+5
(i) Magnetic ordering in antiferromagnets.
(ii) Conducting mechanism in polypyrrole.
- (b) Explain the applications of Paulings rules to the analysis of actual structure of crystals.
- (c) Write a note on thermonuclear reactions.

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