



THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Write short answers to the following questions. (15x2=30)

- i. Describe four level lasers with diagram.
- ii. What is population inversion in laser?
- iii. What is stimulated emission?
- iv. What are metastable ions?
- v. What is nitrogen rule? Give its significance.
- vi. What is spin-spin relaxation process?
- vii. Briefly describe the basic principle of NMR.
- viii. What is the difference between single focusing and double focusing analyzer?
- ix. What is Larmor frequency?
- x. Give some advantages of laser.
- xi. What is tandem mass spectrometry?
- xii. What is shielding and deshielding in NMR?
- xiii. Describe optical resonator as laser system component.
- xiv. Mass spectrometry is different from other spectroscopic methods. How?
- xv. Why deuterated solvents are used in NMR?

Write detailed answers to the following questions.

Q no 2:

- (a) Discuss the instrumentation of NMR. (5)
- (b) Write down the analytical application of NMR spectroscopy. (5)

Q no 3:

- (a) Describe the basic principle of mass spectrometry. (5)
- (b) Discuss electron ion ionization of sample in mass spectrometry. (5)

Q no 4:

- (a) Write down the construction, working and uses of ruby laser. (5)
- (b) Discuss properties and applications of nitrogen laser. (5)