

Time : 2 ½ hrs

Total Marks : 60

**Instructions:**

**All questions carry equal marks**

**Draw a suitable diagram whenever necessary**

**All questions carry equal marks**

**Question 1**

**12 Marks**

Write a short note on protein X-ray crystallography? (Max 1000 words)

**OR**

Write a short note on protein NMR? (Max 1000 words)

**Question 2**

**12 Marks**

Describe how one tackles the phase problem in crystallography using Multiple Isomorphous Replacement (MIR).

**OR**

Describe how one tackles the phase problem in crystallography using Multiple Anomalous Dispersion (MAD).

**Question 3**

**12 Marks**

Explain the meaning of germinal and vicinal coupling. Make use of appropriate examples.

**OR**

Write a short on note ESR.

**Question 4**

**12 Marks**

Explain the correlation between Ewald Sphere and data collection in protein x-ray crystallography.

**OR**

Write a short note on Small Angle X-ray Crystallography (SAXS).

**Question 5: Short notes any *Three***

**12 Marks**

- a) Fiber diffraction.
- b) COSEY
- c) MR
- d) HSQC
- e) NMR: importance of ½ integral spins.
- f) Spin labelling in ESR

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