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OCTOBER 2011 **P/ID 40011/PPHL**

Time : Three hours Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define Lamor frequency.

2. State why C^{12} does not show any NMR spectrum.

3. Why microwave source and techniques have to be applied for the observation of ESR?

4. What is Fermi contact interaction?

5. Define quadrapole coupling constant.

6. Define asymmetry parameter of a quadrapole nucleus.

7. Write about the suitable source for Mossbauer spectrograph.

8. Define isomer shift in Mossbauer spectroscopy.

9. What is Auger energy?

10. Give the principle of EELS.

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PART B — ($5 \times 6 = 30$ marks)

Answer ALL questions.

11. (a) Write about relaxation process in NMR.

Or

(b) Explain chemical shift in NMR with examples.

12. (a) Explain the principle of ESR.

Or

(b) Write about the basic requirements for ESR spectrograph.

13. (a) Discuss about the detection of hydrogen bond by NQR.

Or

(b) Discuss about NQR group frequencies.

14. (a) Give an account on Quadrupole interaction in Mossbauer spectroscopy.

Or

(b) A Mossbauer nucleus ^{57}Fe makes transition from the excited state of energy 14.4 keV to the ground state. What is its recoil energy?

15. (a) Explain a typical RAIRS spectrometer with a diagram.

Or

(b) Explain the principle of photo electron spectroscopy.

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PART C — (5 × 10 = 50 marks)

Answer ALL questions.

16. (a) Derive Bloch equations and obtain its steady state solutions.

Or

(b) Give the theory of NMR and obtain the condition for resonance.

17. (a) Discuss the principle and working of a ESR spectrometer with a block diagram.

Or

(b) Discuss about hyperfine structure of ESR absorption.

18. (a) Explain

(i) Halogen quadrupole resonance and

(ii) Quadrupole resonance of minerals

Or

(b) Describe the experimental techniques for studying NQR.

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19. (a) Explain the principle and instrumentation of Mossbauer spectroscopy.

Or

(b) Give the theory of chemical shift in Mossbauer spectroscopy with examples.

20. (a) Discuss the principle and applications of

(i) XPES and

(ii) UPES.

Or

(b) Describe a EELS spectrometer with a suitable diagram.

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