Seat No. _____

HA-003-1204002

M. Sc. (Sem. IV) (CBCS) (W.E.F. 2016) Examination

April - 2023

CT-12 : Physics

(Experimental Techniques wth Interdisciplinary Applications)

Faculty Code : 003
Subject Code : 1204002

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

Instructions : (1) All questions carry equal marks.
(2) Symbols have their usual meanings.

1 Answer any seven in brief : **14**

(a) Write the names of beta radiation sources.

(b) What are the different units of radioactivity?

(c) What do you mean by short wavelength limit of X-rays?

(d) State the principle of X-ray production.

(e) What are stable and unstable paramagnetic substances?

(f) What are the basic requirements of IR radiation source?

(g) What are the degrees of freedom of linear molecule?

(h) What is mass spectrum?

(i) What do you mean by shielding in NMR spectroscopy?

(j) What is hyperfine interaction in Mossbauer spectroscopy?

2 Answer the following questions : (Any two out of three) **14**

(a) Discus in detail: Continuous and Characteristic X-rays.

(b) Discuss XRF in detail.

(c) Discuss GM counter in detail.

3 Answer the following questions : (both are compulsory) **14**

(a) Discuss the theory of ESR.

(b) Derive Larmor equation of NMR Spectroscopy.

OR

3 Answer the following questions : (both are compulsory) **14**

(a) How will you explain hyperfine interactions in ESR spectroscopy? Discuss with necessary examples.

(b) Discuss Continuous Wave NMR Spectrometer with all details.

4 Answer the following questions : (Any two out of three) **14**

(a) Discuss the process of absorption of IR radiation.

(b) Discuss various modes of vibrations of atoms in molecule.

(c) Discuss the important condition to observe resonance fluorescence in Mossbauer Spectroscopy.

5 Write any two short notes on : **14**

(a) Mossbauer Spectrometer.

(b) Isomer shift in Mossbauer Spectroscopy.

(c) Theory of Mass Spectrometer.

(d) Neutron diffraction and X-ray diffraction.

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