



NBV-003-020407 Seat No. _____

M. Sc. (Sem. IV) (CBCS) Examination

April / May - 2017

**ID - 3 : Experimental Techniques with
Inter Disciplinary Applications**

Faculty Code : 003

Subject Code : 020407

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instructions :

1. All Questions are compulsory.
2. All Questions carry equal Marks.

1 Answer any seven : 14

- (i) Write the principle of ionization based detectors.
- (ii) Write any two units of radioactivity.
- (iii) Find the shortest wavelength limit for the X-ray tube operating at potential difference of 45 kV.
- (iv) Write the principle of a mass spectrometer.
- (v) Show the diagram of nuclear energy levels of a nucleus having nuclear spin $I = 3/2$.
- (vi) What do you mean by absorption spectra?
- (vii) Write the basic principle of ESR.
- (viii) Write various Mossbauer parameters.
- (ix) What is the full form of XFS and XRD?
- (x) In which of the following, the NMR signal is not observed?
 ^{16}O , ^{12}C , ^1H

2 Write any two :

- (a) Discuss various sources of electromagnetic radiation. 7
- (b) Discuss interaction of gamma rays with matter in detail. 7
- (c) Discuss various popular sources of IR radiation. 7

- 3 (a) State the principle of production of X-rays. Discuss X-ray generating equipments in detail. 7
- (b) Discuss various X-ray spectra. 7

OR

- 3 (a) Write the principle of X-ray absorption and X-ray fluorescence technique. Discuss in detail the X-ray absorption technique. 7
- (b) Make a list of various X-ray detectors. Discuss any one of the detector in detail. 7

4 Write any **two** :

- (a) Discuss magnetic deflection mass spectrometer in detail. 7
What is its resolution? Discuss.
- (b) Draw the neat diagram of ESR spectrometer. 7
Discuss its working in detail.
- (c) Discuss the Mossbauer spectroscopy in detail. 7

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

- (i) Comparison of Neutron diffraction and X-ray diffraction
- (ii) NMR spectroscopy
- (iii) Sources of uncharged radiation
- (iv) X-ray fluorescence techniques.