M. Sc. Chemistry Examination, 2018

(3rd Semester)

Analytical Chemistry Special

Paper XI-A

Time : Two hours   Full Marks : 50

(25 marks for each unit)

Use a separate answerscript for each unit.

UNIT - A - 3111

1. Answer *any five* from the following :   1×5

   i) What is the Fundamental difference between DTA and DSC ?

   ii) How the crystalline water and the coordinated water of a complex salt are identified by TGA ?

   iii) What is the role of thermal insulator in DSC instruments ?

   iv) What do mean by diluents related to the DTA experiment ?

   v) What do you mean by endotherm and exotherm in DTA ?

   vi) What is dynamic thermogravimetric analysis ?

2. How the sample mass influences the TGA and DTA experiment ? How the shapes of the crucibles and the material of the crucible affect the results of TGA ?   2+1+2

3. What types of furnaces are utilized for the construction of the thermal instruments ? What is meant by furnace atmosphere and how this furnace atmosphere affects the TG curve ? What will happen if the overheating of furnace occur due to the malfunction of the instrument ?   1+1+2+1

4. What is null point balance ? How does it work in a thermogravimetric instrument ? What different deflection types of balance are used in thermogravimentric instrument ?

    3+2

5. What is power compensation DSC ? How does it differ from the heat flux DSC ? Give a line diagram of the instrument of power compensation DSC mentioning all the components.

    1+1+3

UNIT - A - 3112

6. Explain, with proper diagram, why five-fold rotational symmetry does not exist in crystals.   5

7. Define crystal system, and describe each crystal system mentioning the number of variable parameters.   3

8. State the meaning, and draw stereographic projections, of any three of the following :

    (i) 2mm   (ii) 32   (iii) $\dfrac{4}{m}$ mm   (iv) 23 (v) $\bar{6}$ $1\frac{1}{2}$×3

9. Write short note on *any two* of the following :

    a) axial glide

    b) Miller indices

    c) reciprocal lattice   2×2

10. Define space group. Describe the space groups, along with their notations, under the monoclinic system.   4

11. What are meant by ''structure solution'' and ''structure refinement'' ? Comment on the significance of refinement index (R-value). $3+1\frac{1}{2}$