Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Sc.I**

FCYE804

8th Semester Regular Examination 2017-18
INST. METHODS. OF CHEMICAL ANALYSIS-II
BRANCH : M.Sc.I(AC)
Time : 3 Hours
Max Marks : 70
Q.CODE : C305
Question No.1 which is compulsory and any five from the rest
The figures in the right hand margin indicate marks.

Q1. **Answer the following questions :** **(2 x 10)**

a) What is the meaning of proximate analysis? How Proximate analysis of coal is done by thermogravimetry?

b) What information is obtained from thermomechanical analysis (TMA)? What are the different types of TMA?

c) Mention the processes that led to weight gain and loss in thermogravimetry.

d) What is 'resonance fluorescence'? Give one example.

e) What is photosensitization? Explain with example.

f) For a photochemical reaction A→B, 1 x 10^{-5} moles of B were formed on adsorption of 6.0 joules at 3600 ˚A. Calculate the quantum efficiency.

g) What is the difference between fluorescence and phosphorescence?

h) What is an electrical double layer?

i) What is convection in mass transfer? What is its effect on concentration polarisation?

j) What is a reference electrode? Give examples of any two reference electrodes and give their half-cell reaction.

Q2. **a)** Describe the various types of curves obtained from thermogravimetric (TG) experiments, and discuss their interpretation. In the thermogravimetric analysis of 0.25 g of $Ca(OH)_2$, the loss in weight at different temperatures were: 0.018 g at 100 – 150 ˚C (loss of hygroscopic water), 0.038 g at 500 – 560 ˚C (dehydration) and 0.0229 g at 900 – 950 ˚C (dissociation). Determine the percentage of $Ca(OH)_2$ in the analyzed sample. **(4+3)**

b) What is differential thermogravimetry (DTG) analysis? How DTG analysis helps in quantitative evolution for overlapping reactions? **(1+2)**

Q3. **a)** What is differential thermal analysis (DTA)? Concisely explain the working principle and different components of DTA apparatus with schematic block diagram. **(1+2+4)**

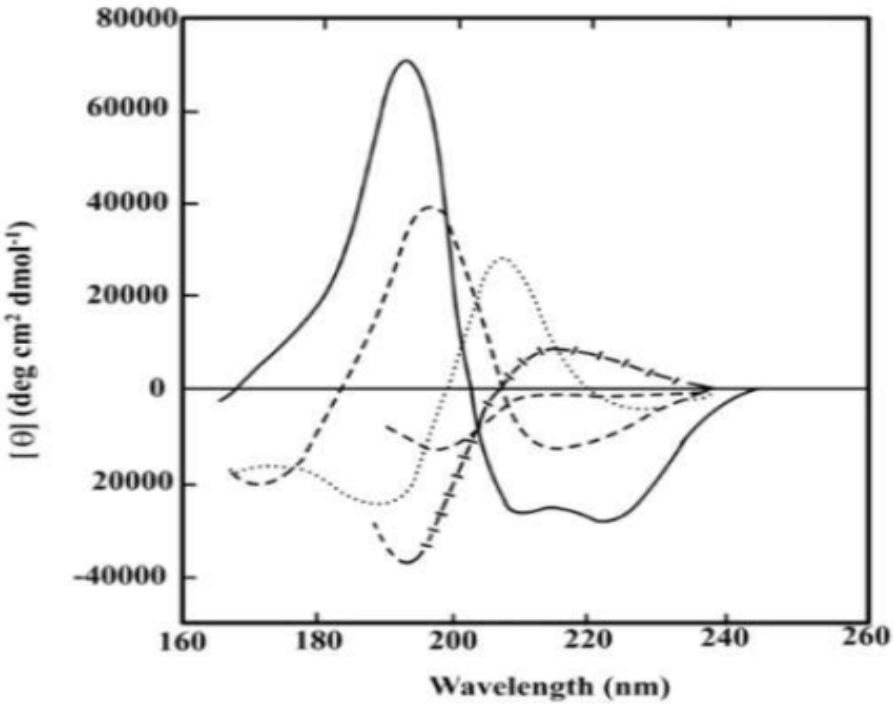
b) How furnace atmosphere influence the DTA result? Illustrate with an appropriate example. **(3)**

Q4. **a)** What do you understand by quenching of fluorescence? Derive Stern-Volmer equation. **(1+4)**

b) Draw a block diagram of a fluorimeter and explain the different components. **(5)**

Q5. **a)** With block diagram describe the working principle of a circular dichroism (CD) Spectrometer. **(5)**

b) Analyze the typical CD spectrum (protein of different kinds of confirmations) given below. **(5)**



Q6. **a)** What is cyclic voltammetry? Give a brief explanation on the principle and instrumentation of cyclic voltammetry. What information do you get from a cyclic voltammogram? **(7)**

b) What is Randles-Sevcik equation? Discuss its significance. **(3)**

Q7. **a)** Discuss briefly the principle and instrumentation of controlled-current Coulometry. **(6)**

b) What is Polarography? Discuss the principle and instrumentation of Polarography. **(4)**

Q8. **Write notes on (Any TWO) :** **(5 x 2)**

a) Forster's resonance energy transfer (FRET).

b) Internal conversion and intersystem crossing.

c) Charge-transfer polarisation