

### Course-401B

Show the relationship between transmittance and molar extinction coefficient. Deduce the Beer's law. What are the limitations of Beer's law?	1+3 +2
What is isosbastic point? State usefulness of the isosbastic point.	1+2
Elaborate the continuous variation method and mole ratio method to determine the metal ligand ratio of a complex and what are the advantages of continuous variation method over mole ratio method.	5+1
Discuss about the applicability of Beer's law in case of a mixture.	2
Why does concentrated solution of absorbing species deviate from the Beer's law	2
Do you think a dilute solution of absorbing species can deviates from the Beer's law? Justify with reason	2
Discuss about the Instrumental factors responsible for the deviations of Beer's law?	3
Why do we select the wavelength at the absorption maxima for concentration determination?	2
What are the sources of stray light in spectrophotometer? How does it affect the spectral determination?	3
What are the advantages of colourimetric method over gravimetry or titrimetry?	2
Discuss about the common variables that influence the absorbance of a species.	2
Discuss about two advantages of selecting wavelength at absorption maxima in absorbance measurements.	2
On which factors spectral width of the emission spectra is dependent? Discuss elaborately.	4
What is standard addition method for determining unknown sample concentration? Discuss about the method.	1+3
Calculate the standard deviation of concentration of a unknown sample in standard addition method.	2
What is (are) the basis of choosing standard addition method?	2
What are the advantages of standard addition method over single point addition method?	
What is photometric titration curve? What are the advantages of photometric titrations.	1+2
Discuss about the application of photometric titration in the acid base titration.	3

Photometric titration is useful in complexometric titration of a binary mixture of cations. Elucidate with suitable example 3

‘The continuous variation method can determine the stoichiometric ratio of a cation and ligand and also the formation constant a complex.’ Discuss 4

Discuss about the mole ratio method in determining the formation constant of a complex 3

Atomic absorption spectra is more sensitive than atomic emission spectra. Explain 3

What are the advantages of slope ratio method? 2

What are the basic differences between the nephodometry and turbidometry? 3

Write about the important applications of the spectrophotometry? 3

Discuss the role of solvent in spectrophotometric measurements. 2

How does solvent affect the spectral properties of chromophores? 2

Define DSC and DTA what are the differences between these two? 3

How does rate of heating affect the thermogravimetric analysis? 2

Write few uses of thermogravimetric analysis 2

### Course 402B

d. What is known as ‘one dimensional conductor’? Why it is named so?

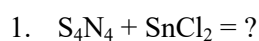
Discuss about one synthetic process of polythiazyl. Discuss about the mechanism of polythiazyl synthesis. 2+2

6.a. Write about the bonding and structure of polythiazyl. 3

b. Discuss about the synthesis and structure of  $S_4N_4$ . How would you prepare  $S_3N_3^-$  from  $S_4N_4$ ? 3+2  
Discuss about the structure, bonding and the  $\pi$ - molecular orbital system of the molecular anion  $S_3N_3^-$ . 2+2

d. How is  $S_4N_2$  is synthesized from  $S_4N_4$ ? 2

7.a. Write about the product(s) and their structure(s) of the following reactions: 2



b. How do you prepare  $S_2N_2$  from  $S_4N_4$ ? What are the primary condition(s) to be followed in the preparation of  $S_2N_2$ ? 2+1

c. Write about the structure of  $S_2N_2$  and  $S_4N_4F_4$ ? 3

What is known as phosphazenes? How do cyclic phosphazenes are synthesized? 1+2

8.a. Discuss about the structure and bonding of trimeric phosphazenes. Does trimeric phosphazenes show aromaticity? If yes justify your answer. 4+2

b. What is known as ‘phospham’? How ‘phospham’ is prepared? Give few uses of ‘phospham’. 1+1

c. What is polycarbaphosphazne. How it is prepared? 2+2

Discuss about the structure and bonding of tetrameric phosphazenes. Does tetrameric phosphazenes show 4+2

d. aromaticity? If yes justify your answer.

**Course 403B**

3x4

9. 3 mark question

i How does liquid crystals display calculator?

ii Liquid crystals are defined as 'orientationally ordered liquids or positionally disordered solids' justify

iii What is known as 'thermotropic liquid crystals'? How they are classified? What are the basic characteristics of mesogens forming thermotropic liquid crystal?

Give example of (i) rod like mesogens (ii) Disk shaped mesogens (iii) banana shaped mesogens

What are the similarities and differences between nematic and cholesteric phases of liquid crystal?

Why does liquid crystal shows optical anisotropy in general?

What properties of liquid crystal enables it to use as display applications?

iv What is the orientational order parameter (S) of nematic phase? What are the values of 'S' near clearing temperature and below the clearing temperature?

Write about the methods characterization of liquid crystals.

Write about the use of liquid crystals in display application

Define supra-molecular chemistry. What are the interactions involved in supra-molecules?

How does crown ethers binds alkali metal ions. Depict pictorially.

Can a 12 crown-5 bind  $\text{Cs}^+$  ion? If yes, describe the binding mode.

What are the differences between lariat ethers and podants? Define coronands and cryptands with examples.

Discuss with example of a photo-induced molecular switch.

How does host guest interaction function as an ion sensor. Write briefly with suitable example.

Site examples of redox (electron) driven (i) guest binding host & (ii) guest expulsion host molecules with pictorial presentations

What are the advantages of macrocyclic polyamine over crown ethers?

How does macrocyclic polyamine bind both anions and cations?

Write about an artificial enzyme system with suitable example.

How does macrocyclic polyamine bind  $\text{Zn}^{2+}$  ion and system can mimic an artificial enzyme?

What is cyclo-dextrin? Describe the structural features of cyclodextrins.

'Cyclo-dextrin is analogous to the reaction pockets of the enzyme' Justify

What is known as dendrimers and how do dendrimers is synthesised?

Write about the advantages and disadvantages of divergent and convergent methods of dendrimer synthesis.

Write about the 'calixarene'. Why 'calix[8]arene' is important in fullerene chemistry?

Discuss about the cytochrome-c analogue dendrimer.

Discuss with examples the self assembly of coordination compounds.

Define nanomaterials and why nano science is so important in modern age?

According to Siegel, how nanomaterials are classified?

Discuss briefly about one synthesis method of nano materials. What are the advantages of physical methods of synthesis over chemical methods.

Why nano-materials are different from the bulk materials? Which property(ies) of nano-materials is(are) important for the catalytic action of nano-materials.

Discuss about the mechanical properties of nano-materials.

What are the major disadvantages of nano-materials?

Describe one chemical method of nano material synthesis.

What is the sol-gel method of nano material synthesis? Discuss about the steps of sol-gel method

Discuss briefly about the function of nano-materials in high definition TV.

How is nano materials are characterized?

Discuss about the thickness measurement of thin films. Why correction factor is required in determining the thickness of thin film?

Discuss about two methods of thin film characterization techniques?