UNIVERSITY OF THE PUNJAB

Seventh Semester 2017
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Analytical Chemistry (Sp. Theory-II)
Course Code: CHEM-413

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Section I

Q.2- Attempt all Short questions (2x10=20)

(i)- Give the advantages of Fourier transform IR over dispersive IR?.

(ii)-.Distinguish between internal conversion and fluorescence.

(iii) -. Name various vibrational modes of CO_2 and indicate which are IR active and Which are Raman active.

(iv)-. How will you distinguish between rotational and vibrational Raman spectroscopy?

(v)- What is the role of solvent in UV spectroscopy ?

(vi) Which gas is used to make plasma in ICP and what are advantages of this gas?

(vii)- What are the steps in ICP analysis?

(viii) Give some advantages of IR over Raman spectroscopy?

(ix) Define quantum yield of fluorescence and give it's characteristics

(x) Why grating is preferred over prism in UV/Visible spectroscopy ?

Section II

Attempt all questions

Q.3(a)-Discuss radiation filters used in UV/Visible spectroscopy (5)

(b)-Explain the phenomenon of metal isotope spectroscopy (5)

Q.(4)-(a) Explain the types of emitted Raman radiations (5)

(b). Discuss radiation sources of Infrared spectroscopy (5)

Q.5- (a) Explain the purpose and operation of nebulizer in ICP. (5)

(b)- Discuss the applications of fluorescence. (5)

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Course Code: CHEM-413 **MAX. MARKS: 50**

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SUBJECTIVE

Section I

Q.2- Attempt all Short questions (2x10=20)

(i Write down the selection rule for infrared absorption.

(ii)-.Distinguish between internal conversion and fluorescence.

(iii) -. Define overtones and combination bands.

(iv)- What are radiationless deactivation processes ?

(v)- What are the advantages and disadvantages of photodiode detector?

(vi) Describe the basic principle of ICP-AES.

(vii)- What is difference between Anti-Stokes transition and Stokes transition in Raman spectroscopy?

(viii) What is the role of beam splitter in FT-IR?

(ix) What is resonance fluorescence? Give an example.

(x) What are the advantages of grating over prism?

Section II

Attempt all questions

Q.3(a)-Discuss the two types of gratings being used in UV/Visible spectroscopy. (5)

(b)-Discuss different vibrational modes in infrared spectroscopy. (5)

Q.(4)-(a) Discuss Laser sources in Raman spectroscopy. (5)

(b). Discuss the sampling techniques in FT-IR spectroscopy. (5)

Q.5- (a) Explain pumps and spray chambers for sample introduction in ICP-AES (5)

(b)- Write down the applications of atomic fluorescence spectroscopy. (5)

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Seventh Semester – 2019

Examination: B.S. 4 Years Program

Roll No. .....

PAPER: Analytical Chemistry (Sp. Theory-II)
Course Code: CHEM-413 Part – II

MAX. TIME: 2 Hrs. 45 Min.
MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2 Attempt all Short questions (2x10=20)

(i) Distinguish between Raman scattering and Rayleigh scattering.

(ii) Differentiate between vibrational deactivation and internal conversion.

(iii) How axial torch and radial torch in ICP-AES differ?

(iv) What is meant by allowed transitions and forbidden transitions in UV/Visible spectroscopy?

(v) Write down the advantages and disadvantages of ICP-AES.

(vi) Give the disadvantages of coloured glass filters in UV spectroscopy.

(vii) What are the differences between IR spectrum and Raman spectrum?

(viii) Explain that mostly IR active vibrational modes are Raman inactive and vice versa?

(ix) How thermal detectors and photon detectors differ in their operation in FTIR spectroscopy?

(x) Describe Kasha's Rule and Mirror Image Rule in Fluorescence?

Q.3(a) Explain various components of Raman spectrometer. (5)

(b) Write down the quantitative applications of UV/Visible spectroscopy. (5)

Q.4(a) Draw Jablonski energy diagram and discuss it's various phenomena. (5)

(b) Explain different zones present in ICP plasma. (5)

Q.5(a) Discuss the working and advantages of Photo multiplier tubes detector. (5)

(b) Discuss the working of FTIR Spectrometer. (5)

UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program :Seventh Semester – 2020

Roll No. .....

Paper: Analytical Chemistry (Sp. Theory-II) **Time: 2 Hrs. 45 Min. Marks: 50**

Course Code: CHEM-413 **Part – II**

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Give short answers of the following: **(10x2=20)**

1. Compare internal conversion with external conversions?
2. Describe the basis for radiation detection with silicon diode transducer.
3. Compare echellete grating with dispersive prisms.
4. Define absorptivity and its units.
5. Explains population inversion and light amplification.
6. Contrast between fabry perot etalon and fabry perot interferometers.
7. How holographic grating are produced and their advantages over master gratings.
8. Write about the components of Monochromators.
9. Compare cornu prism with Littrow prism.
10. Compare lifetime of phosphorescence and fluorescence?

Answers the following questions. **(3x10=30)**

Q.3. (a) Explain various components of Cznery turner monochromators. (5)

(b) Discuss the working and advantageous of charge injection devices. (5)

Q.4 (a) Describe multichannel spectrometer used in ICP. AES. (5)

(b) Write not on molecular electronic energy level. (5)

Q.5. (a) Describe the working of pyroelectric detectors and compare them with bolometer. (5)

(b) Describe in detail Fourier transformer spectrometers instruments. (5)

UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program : Seventh Semester – Fall 2021

Roll No. .....

Paper: Analytical Chemistry (Sp. Theory-II) Course Code: CHEM-413 Time: 3 Hrs. Marks: 60

Q.1. Answer the following short questions: **(15x2=30)**

1. What Kind of molecules show IR Spectra?
2. How do you determine the No. of Vibrational modes?
3. Why laser is used in Raman Spectroscopy?
4. What are different modes of vibration in IR spectroscopy?
5. What is the difference between chromophore and auxochrome?
6. Why is Raman Spectroscopy method said to be better than FTIR spectroscopy in analyzing polymers?
7. What do you mean by electromagnetic spectrum?
8. What does it mean to have high vibrational energy?
9. Describe different types of Lasers?
10. What are the detectors used in IR spectrophotometer?
11. Difference between Atomic absorption spectroscopy and Atomic fluorescence spectroscopy?
12. How Plasma is generated In Inductively coupled plasma?
13. What does ICP measure?
14. Which wavelength selector is used in UV visible spectrophotometer?
15. Which material are used to make sample cell for UV Visible Spectrophotometer?

Answer the following questions. **(3x10=30)**

Q.No: 2 a) Comparison between Raman and IR Spectroscopy. (5)

b) Explain various components of Raman spectrometer. (5)

Q.No: 3 a) What is meant by Atomic fluorescence spectroscopy? (5)

b) Instrumentation and Applications of absorption photometry. (5)

Q.No: 4 a) State beer's law? How is transmittance defined and how does it relate to absorbance? (5)

b) Give instrumentation and Applications of fluorescence spectroscopy. (5)