

(87 & A-36) Seat No.: _____

No. of Printed Pages: 2

SARDAR PATEL UNIVERSITY

M.Sc. (Organic Chemistry) Semester-III Examination

Spectroscopy-I (PS03CORC01)

02:00 p.m. to 05:00 p.m.

N.B. (1) Figures to the right indicate full marks.

Friday, Date: 21-10-2016

(2) Attempt all Questions.

[Total Marks: 70]

Q-1. Choose the correct alternatives from the following.

[8]

- EDL sources in AAS are used for elements
(A) Se (B) Ca
(C) Ba (D) Sr
- The main advantage of ICP-AES technique over conventional analysis is
(A) Handling of gaseous and liquid samples is easier
(B) Analysis of single metal is faster
(C) Analysis of 20 to 30 elements can be performed in one run.
(D) Multi elemental analysis can be performed in sequential run.
- The delayed fluorescence step $2^3A^* \longrightarrow ^1A + ^1A^*$ is given by mechanism
(A) P Type (B) E Type
(C) Recombination (D) None of the above
- Which of the following shows maximum fluorescence quantum yield?
(A) Amino benzene (B) Nitro benzene
(C) Benzene (D) Benzoic Acid
- Which element does not give ESCA?
(A) H (B) He
(C) Ne (D) none
- In the ESCA spectrum of S in sulphur compounds containing S^{2-} , S^0 , S^{4+} and S^{6+} peaks the maximum chemical shift was observed in
(A) S^{6+} (B) S^0
(C) S^{4+} (D) S^{2-}
- In STM the sample surface is coated by a thin film of
(A) Gold (B) Iron
(C) Silicon (D) Potassium
- In AFM, cantilevers are made up of
(A) Silicon nitride (B) Steel
(C) Carbon (D) Gold

(P.T.O.)

(1)

Q- 2. Answer any seven from the following.

[14]

- (i) Using flow diagram show the relevant steps involved in atomization process by flame atomizer in AAS.
- (ii) Draw the labeled diagram of hollow cathode lamp and give its working.
- (iii) Give two methods for overcoming the chemical interferences by phosphate ions for Ca determination by AAS.
- (iv) What is Stokes shift?
- (v) Define chemiluminescence.
- (vi) What is work function?
- (vii) What are shake up satellite peaks in ESCA spectrum ?
- (viii) What is tunneling current? Give the equation to find out magnitude of tunneling current.
- (ix) Why is AFM more useful than STM for applications in biological specimens?

Q- 3. (a) Write a note on ICP source, giving its diagram, construction and working. Also give two main advantages of ICP cell.

[6]

**Q- 3. (b) (i) Draw the schematic diagram of instrumentation of flame photometer.
(ii) Write about applications of flame photometry.**

[6]

OR

Q-3. (b) Explain with diagrams - Total consumption burner and Premix burner .

[6]

Q- 4. (a) Draw the labeled energy level (Jablonski) diagram of molecular fluorescence. Explain inter system crossing over?

[6]

Q- 4. (b) Write about applications of fluorescence spectroscopy.

[6]

OR

Q- 4. (b) Distinguish between fluorescence and phosphorescence.

[6]

Q- 5. (a) Give a schematic diagram of Auger electron spectrometer.

[6]

Explain construction and working with advantages of electron flood gun used here.

Q- 5. (b) Describe the mechanism of production of KLL Auger electron.

[6]

OR

Q- 5. (b) Write in detail about applications of ESCA technique.

[6]

Q- 6. (a) Draw the schematic diagram of Atomic Force Microscope. What are the two modes of operation of tip

[6]

Q- 6. (b) Draw the schematic diagram of instrumentation of STM. Give two modes of operating it.

[6]

OR

Q- 6. (b) Discuss in brief scanning electron microscopy (SEM)

[6]

ALL THE BEST

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