

SEAT No. \_\_\_\_\_

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SARDAR PATEL UNIVERSITY  
M.Sc.-III-SEMESTER(Old Course) Examination  
M.Sc. Organic chemistry  
PS03CORC01: Spectroscopy-I

Date: 01/01/2023, Friday

TIME: 10:00 AM-12:00 PM

TOTAL MARK: 70

Q.1 (a) Choose the correct answer of the following question in your answer sheet. [08]

- Which element does not capable to show MNN auger effect,  
(a) Au (b) Sc (c) Pt (d) Hg
- In Flame atomizer, during dissociative step, molecular (MX) form convert into,  
(a) molecular vapor form (b) Neutral free gaseous atom  
(c) Fine aerosol droplet of molecular form (d) molecular solid form
- \_\_\_\_\_ correspond to emission of radiation during the electron transition form an excited level to a lower level without electron spin reversal.  
(a) Phosphorescence (b) Biochemi luminescence  
(c) Fluorescence (d) None of all
- Radio wave have wavelength \_\_\_\_\_  
(a) 10 - 200 nm (b)  $10^{-5} - 10^{-3}$  nm (c) 0.3 mm - 0.5 m (d) 0.5 - 300 m
- \_\_\_\_\_ is attenuation in the intensity of EMR after passing through sample.  
(a) Intensity (b) Path length (c) Absorbance (d) Transmittance
- In AAS, \_\_\_\_\_ is a continuous source which emits radiation over a wide range of wavelength.  
(a) Hollow cathode lamp (b) Xe-lamp (c) Hg vapor lamp (d) Laser
- Fluorescence more commonly found in compounds in which lowest energy transition is \_\_\_\_\_.  
(a)  $\sigma - \sigma^*$  (b)  $n - \Pi^*$  (c)  $n - \sigma^*$  (d)  $\Pi - \Pi^*$
- \_\_\_\_\_ is energetic level at which the attraction of particular atom becomes identical to its attraction to other atom in solid.  
(a) Conduction band (b) Fermi level (c) Valence band (d) none of all

Q.1 (b) Do as directed.

[16]

- Which halogenated naphthalene shows highest phosphorescence intensity.
- Radio wave has wavelength range \_\_\_\_\_ nm.
- The compounds with \_\_\_\_\_ energy transition can commonly shows fluorescence.
- $\lambda_F > \lambda_A$  condition is suitable for stock fluorescence. (T/F)
- Write basic principle of SEM.
- Write full form of AES.
- Define phosphoresces.
- What is Photoluminescence?
- Aniline gives fluorescence but nitro benzene does not give fluorescence. (T/F)
- \_\_\_\_\_ measure the electrical conductance between the probe tip and the

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[P.T.O.]

surface.

11. \_\_\_\_\_ is a reagent whose reaction with an interferant is more favorable than the interferant's reaction with analyte.
12. The probability of emission of auger electron decrease with \_\_\_\_\_ atomic number of the emitting element.
13. What is Coalitional activation process?
14. What is AAS?
15. Write different types of lamps used in AES.
16. Write one application of atomic force microscope.

**Q.2 Answer any SEVEN of following question briefly. [14]**

1. Write the spectral line  $\lambda$  used in atomic absorption measurement for following atom: Na, K and Li.
2. AAS is more preferable then AES is the easiest method for quantitative analysis of metal in presence of interference.
3. Aniline gives fluorescence but nitro benzene does not give fluorescence. Why?
4. Explain how structural rigidity affects the fluorescence?
5. Give detail of Spherical electrostatic analyzer used in ESCA.
6. Discuss in detail about cylindrical mirror analyzer used in ESCA.
7. Explain the basic principle of AFM.
8. Explain the detail about tip and cantilever used in AFM.
9. Give neat and labeled diagram of STM instrument.

**Q.3 Describe ESCA. Explain the two analytical application of ESCA. [8]**

**OR**

**Q.3 Discuss in detail any two analytical applications of auger electron spectroscopy. [8]**

**Q.4 Write a short note on Scanning tunneling microscopy. [8]**

**OR**

**Q.4 Give the detail about the instrumentation of AFM. [8]**

**Q.5 Draw neat and labeled diagram of Atomic emission spectro-photometer and mention the function of each component. [8]**

**OR**

**Q.5 Write a note on (I) Inductively coupled Plasma (ICP) and its merit and demerits over other atomizer (II) Direct Coupled Plasma. [8]**

**Q.6 Explain Fluorescence, Phosphorescence and Chemiluminescence. [8]**

**OR**

**Q.6 Write a note on mechanism of fluorescence [8]**  
(I) E-type delayed Fluorescence  
(II) P-type delayed Fluorescence