

	TANTA UNIVERSITY FACULTY OF SCIENCE CHEMISTRY DEPARTMENT		
	FINAL EXAM FOR SOPHOMORES STUDENTS (BIOCHEMISTRY AND DOUBLE MAJORS)		
	COURSE TITLE:	INSTRUMENTAL ANALYSIS I (CH2244)	TIME ALLOWED: 2 HOURS
DATE: MAY 26, 2018	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	

Question 1. Complete the following sentences: (25 Marks)

- A. Planck's law is and the wavenumber unit is
- B. The exposure of a chemical compound to UV light leads to changing while the exposure to X-ray leads to changing
- C. Tungsten lamp is used in the region of while deuterium lamp is used in the region of
- D. The ion-colored filter is made of
- E. The unit of the extinction coefficient is while the absorbance is unitless due to
- F. Thermopile contains a group of
- G. A check on the instrumental factor (for the deviation of Beer-Lambert laws) can be made by plotting versus
- H. The disadvantage of Nernst glower is while the advantage of tungsten-halogen lamp is
- I. The relation between absorbance and transmittance is
- J. The absorption curve is a relation between versus
- K. The deviation of Beer-Lambert laws based on chemical factor is caused by
- L. The light source is defined as and its types are and
- M. The long-wave pass filter is described as
- N. The prism is made of in the IR region while in the UV-visible region, the prism is made of but it is made of in the visible region.

Question 2. Compare between the followings: (25 Marks)

- A. Photometric titration diagrams of:
 - i) Nonabsorbing sample versus a nonabsorbing titrant to produce an absorbing compound,
 - ii) Nonabsorbing sample versus an absorbing titrant to produce a nonabsorbing compound.
- B. The electronic transitions in stilbene and trimethylamine (structures and transitions)
- C. Single beam and double beam spectrophotometers (diagrams only)
- D. Mole-ratio method and continuous variation method (principle and diagrams only)
- E. Prism monochromator and grating monochromator (diagrams only)

Question 3: [28 Marks]

- a) Give reasons for the following statements: (6 Marks)
 - i. The graphite furnace technique is especially suited to micro and trace analysis.
 - ii. Most of phosphorescence cannot be recorded in solution at room temperature.

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- iii. The relation between fluorescence intensity and concentration is not always linear.
- iv. Detectors in spectrofluorometer lie at right angle with light source.

- b) Explain: (15 Marks)
- i. Atomization steps in the flame technique with diagram.
 - ii. Difference between photometry and fluorometry (law, graph).
 - iii. Interference (definition, types and examples) in the atomic absorption spectroscopy.
- c) Illustrate with drawing "Jablonsky diagram" and define the different processes of deactivation the excited states. (7 Marks)

Question 4: Choose the correct answer (22 Marks)

1. In which state the concentration of the element is measured in the atomic absorption spectroscopy?
a) gaseous state b) solution state c) solid state d) plasma state
2. The excellent exciting light source used in the atomic absorption spectroscopy is:
a) low pressure lamp b) hollow cathode lamp
c) Xenon lamp d) tungsten-halogen lamp
3. Which of the following is not active in IR absorption spectroscopy?
a) CHCl_3 b) CH_4 c) Cl_2 d) C_6H_6
4. Fluorescence occurs within:
a) 10 s b) 10 ms c) $10\mu\text{s}$ d) 10 ns
5. Which of the following statements best defines luminescence?
a) Emission of light due to nonthermal process, a chemical reaction or the absorption of ionizing radiation
b) The emission of light by a substance after absorption of excitation energy
c) Light is absorbed by the ground state atoms
d) Emission of light requiring a light source
6. In atomic emission spectroscopy, which of the following statements is false?
a) Flame is used to excite the element to a higher energy state
b) A hollow-cathode lamp with a cathode made of the element to be analyzed is used to produce a wavelength of light specific for the material
c) The light is absorbed by the ground state atoms in the flame
d) There is a net decrease in the intensity of the beam
7. The main advantage of fluorescence over UV-Vis spectroscopy is
a) Its compatibility with separation techniques b) Its sensitivity

