

الفيزياء النووية

Examination of Nuclear(Detectors & Accelerators) Physics

For (4 states) Biophysics group
(First term January)

Date: *Wednesday 22 / 1 / 2014*

نظام الساعات المعتره

Time: Two hours only

Regular Students

Total 100 mark

Course No. : *PH 4163*

1) Write in of sentence of the following :-

- * Compare between Alpha - and Beta – Spectra, Cite with example for each.
- * Explain the cross section or linear absorption of detector medium, Cite with example for modifying.
- * What is the versatility of a detector ? (20 mark)

2) a) what are the quenching techniques when interact with a detector medium ?

- b) Describe theory and discuss its recent development in the technology of the cyclotron, in short account. (20 mark)

3) a) What is the principle of operation of the Sloan resonance linear accelerator (lineac) ?

- b) Explain (in brief) each of the following :-
- * The drawback of the ionization chambers.
 - * Working voltage of a Geiger Miiler counter. (20 mark)

4) * Motivate (in brief) of the following :-

Neutron reaction with light helium ^3He nucleus is not so widely used, in spite of it has best detection for thermal neutrons.

- * What is the unit of biological effectiveness or equivalent to man ?
- * Draw Schematic for nuclear electronic detection system. (20 mark)

5) a) Draw sketch for energy levels of donner and acceptor of semiconductor bands, explain.

- b) What is the operation theory of a magnetic spectrometer to measure an Alpha – or Beta – spectrum ? (20 mark)

Best Wishes for Successful ,,

Examiner: Prof. Dr. Mohsen El-Khosht



TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY

INCOMPLETE EXAMINATION FOR CREDIT HOUR STUDENTS

COURSE TITLE: LASER CHEMISTRY		COURSE CODE: CH4113	
DATE: 23 JANUARY, 2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 50	TIME: 2 HOURS

Answer the following questions (5 marks per point):

1- Using suitable diagrams and illustrations, describe each of the following laser systems:

i - Carbon dioxide laser

ii - Excimer laser

iii- Proton transfer dye laser

iv- Bonding in molecular oxygen O_2 and its first two excited states according to molecular orbital theory.

v- Construct the energy level diagram of species in a typical triplet sensitization experiment in which a mixture of naphthalene and benzophenone was irradiated through a 315 nm cut-in filter given the following absorption data:

For naphthalene $S_0 \longrightarrow S_1$ at 385 nm and $S_0 \longrightarrow T_1$ at 465 nm.

For benzophenone $S_0 \longrightarrow S_1$ at 385 nm and $S_0 \longrightarrow T_1$ at 413 nm.

The cut-in filter that absorbs below 315 nm. [Hint: The energy in $k\text{ cal mol}^{-1}$ is obtained as $28500 / \lambda$ (nm)]

2- The synthesis of vinyl chloride from 1,2-dichloroethane is an important multibillion industrial process demonstrating the advantages of laser applications. Write the reaction scheme and mention the advantages of laser application in comparison with thermal applications.

3- The technique of thermal lensing is an important application on laser collimation. Draw a time-resolved thermal lensing experimental setup and trace upon using the technique to study singlet oxygen sensitization kinetics.

4 - Discuss each of the following:

(a) The technique of Raman spectroscopy showing energy level diagram, the spectral output and band assignment.

(b) The principle of MUCAP reagent operation

(c) Oxygen sensors based on fluorescence quenching

(d) Photodynamic therapy (PDT)

5 - Explain the reason for each of the following:

(a) Carbonyl compounds are common triplet sensitizers

(b) R6G- I^- solutions are strongly fluorescent in ethanol but non-fluorescent in chloroform.

EXAMINER: PROF. DR. EL-ZEINY MOUSA EBEID

