	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	FINAL EXAM FOR SENIORS STUDENTS OF MATERIAL SCIENCE- LEVEL THREE			
COURSE TITLE:	Solar Energy Conversion Devices I		COURSE CODE: MS3111	
DATE:	14 JANUARY 2021	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 120 MINS

Answer the following:

Question 1

(20 marks)

- 1- For a surface located at New Delhi at 1:30 (solar time) on March 1, 2020, if the surface is tilted 45° from the horizontal and pointed 30° west of south. (HINT: $\omega = 22.5$ and $\phi = +28^\circ 35'$) and $\cos \theta = (\cos \phi \cos \beta + \sin \phi \sin \beta \cos \gamma) \cos \delta \cos \omega + \cos \delta \sin \omega \sin \beta \sin \gamma + \sin \delta (\sin \phi \cos \beta - \cos \phi \sin \beta \cos \gamma)$

Find:

- a- The angle of incidence of beam radiation
b- What is the ratio of beam radiation for the surface to that on a horizontal surface?
- 2- The rate at which radiant energy is incident on a surface, per unit area of surface is called.....and its unit is
- a- Insolation & W/m b- irradiance & W/m² c- radiosity & J/m² d- all of these
- 3- Pyranometer: An instrument for measuring total hemispherical solar (.....) radiation, usually on a horizontal surface.
- a- Beam b- diffuse c- beam + diffuse d- None of these
- 4- Fourier equation indicates that the rate of heat transfer by conduction through a plane layer isproportional to the temperature difference across the layer and the heat transfer area, but isproportional to the thickness of the layer.
- a- Inversely & directly b- directly & inversely c- all of these
- 5-number is the ratio of convective heat transfer to heat transfer by conduction in the fluid.
- a- Nusselt b- Grashof c- Prandtl d- Rayleigh
- 6- The net rate of radiative heat flux between two parallel surfaces have absolute temperatures of T_1 and T_2 per unit area is given as:
- a- $\dot{q}_{rad} = \epsilon_{eff} \sigma (T_1^2 - T_2^4)$
b- $\dot{q}_{rad} = \epsilon_{eff} \sigma (T_1^4 - T_2^2)$
c- $\dot{q}_{rad} = \epsilon_{eff} \sigma (T_1^4 - T_2^4)$

d- $\dot{q}_{rad} = \epsilon_{eff} \sigma (T_1^4 - T_2^4)$

Question 2 Choose the correct answer

(20 marks)

1- Theare classified into natural convection and forced convection solar dryers

- a- indirect solar dryers
- b- direct solar dryers
- c- both (a and b)

7- The main parameter which affects the dryer performance is the drying efficiency given by:

- a- $\eta_d = \frac{W_v L_v}{I t} \%$
- b- $\eta_d = \frac{W_v L_v}{I} \%$
- c- $\eta_d = \frac{W_v L_v}{I A t} \%$

8- There are two main types of nonconvecting solar ponds:.....

- a- salt gradient ponds and shallow ponds.
- b- salt gradient ponds and membrane ponds.
- c- membrane ponds and direct solar dryer.

9- There are various types of solar cell materials.....

- a- single crystal materials,
- b- polycrystalline and amorphous Si,
- c- thin film material
- d- all of these

10- For a good solar cell, the series resistance R_s should beand the shunt (parallel) resistance

R_p should be.....

- a- very small & very large
- b- very large & very small
- c- small & large

11- Open circuit voltage (V_{oc}) of a solar cell is given by:

- a- $V_{oc} = \frac{kT}{e} \ln\left(\frac{I_L}{I_0}\right)$
- b- $V_{oc} = \frac{kT}{e} \ln\left(\frac{I_L}{I_0} + 1\right)$
- c- $V_{oc} = kT \ln\left(\frac{I_L}{I_0} + 1\right)$

12- A PV generator is the total system consisting of all PV-modules which are connected in with each other. **Complete?**

13- Complete the following

(30 marks)

- a- The plate-plate collector efficiency (η_c) is defined as.....and is given by the equation.....
- b- Write about convecting or saltless solar ponds
- c- Explain the physical principle of direct absorption dryers?

Question 4


(30 marks)

- 1- Write about the Photovoltaic effect?
- 2- Write in details about single crystal solar cells? Provided with the electrical parameters of the solar cells.
- 3- (a) Calculate the fill factor for a solar cell which has the following parameters:
 $V_{oc} = 0.2 \text{ V}; I_{SC} = -5.5 \text{ mA}; V_{max} = 0.125 \text{ V}; I_{max} = -3 \text{ mA}$
(b) Calculate the maximum power and the conversion efficiency at an intensity of 200 W/m^2 .
Given: $V_{oc} = 0.24 \text{ V}; I_{SC} = -9 \text{ mA}, V_{max} = 0.14 \text{ V}$ and $I_{max} = -6 \text{ mA}$, cell area 1 cm^2 .

EXAMINER

PROF. ALI IBRAHIM

☺ *BEST WISHES* ☺

	FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
	EXAMINATION FOR SENIORS (THIRD YEAR) STUDENTS OF MATERIAL SCIENCE			
TANTA UNIVERSITY	COURSE TITLE:	ATOMIC & MOLECULAR SPECTROSCOPY		COURSE CODE: MS3121
DATE:	10\01\2021	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 H

ANSWER ALL OF THE FOLLOWING QUESTIONS

Question 1

- A) For the hydrogen atom, prove that (15 Marks)

$$\bar{\nu} = R \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$$

where $\bar{\nu}$ is the wavenumber, R is the Rydberg constant, n_f and n_i are the principal quantum numbers of the final and initial energy state, respectively.

- B) Calculate the maximum wavelength for the Lyman series of the hydrogen-spectrum. (5 Marks)
-

Question 2 (30 Marks)

- A) Use the De Broglie's hypothesis to deduce the Bohr's quantization hypothesis of the hydrogen atom. (10 Marks)
- B) What is the angular momentum of an electron moving in the third orbit of a hydrogen atom according to Bohr's model? (10 Marks)
- C) What are the possible multiplicities of a helium atom? (10 Marks)
-

Question 3 (30 Marks)

Write short notes on:

- A) One of the methods used for the production of X-rays. (10 Marks)
- B) Normal Zeeman effect. (10 Marks)
- C) Types of x-ray spectra. (10 Marks)
-

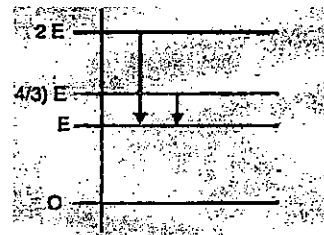
Question 4 (20 marks, 2 marks each)

- 1) Which of the following sets of quantum numbers is not possible?
- A) $n = 4, l = 1, m = 0, s = +\frac{1}{2}$ B) $n = 4, l = 3, m = -3, s = -\frac{1}{2}$
- C) $n = 4, l = 1, m = +2, s = -\frac{1}{2}$ D) $n = 4, l = 0, m = 0, s = -\frac{1}{2}$
- 2) The number of orbitals in 3rd orbit is:
- A) 3 B) 10 C) 18 D) None of the above
- 3) If an electron drops from the 4th orbit to the 2nd orbit in a hydrogen atom, then
- A) It gains 2.55 eV of potential energy B) It gains 2.55 eV of total energy
- C) It emits a 2.55 eV electron D) It emits a 2.55 eV photon

← انظر باقي الاسئلة خلف الصفحة →

4) The figure shows energy levels of a certain atom, when the system moves from level $2E$ to E , a photon of wavelength λ is emitted. The wavelength of photon produced during its transition from level $4/3 E$ to E level is:

- A) 3λ B) $3/4\lambda$
 C) $\lambda/4$ D) 2λ



5) When an electron jumps from a higher orbit to the second orbit in a hydrogen, the radiation emitted out will be in:

- A) Ultraviolet region B) Infrared region C) Visible region D) X-ray region

6) The wavelength involved in the spectrum of deuterium are slightly different from that of hydrogen spectrum, because

- A) Size of the two nuclei are different
 B) Masses of the two nuclei are different
 C) Nuclear forces are different in the two cases
 D) Attraction between the electron and the nucleus is different in two cases

7) The wavelength λ of the emitted radiation, if an electron in a hydrogen atom jumps from the third orbit to the second orbit is : (R is the Rydberg constant)

- A) $\lambda = 36/5R$ B) $\lambda = 5R/36$ C) $\lambda = 5/R$ D) $\lambda = R/6$

8) If the angular momentum of an electron in the second orbit of a hydrogen atom is L, then the angular momentum of the electron in the third orbit of a hydrogen atom is :

- A) L B) 3L C) $\frac{2}{3}L$ D) $\frac{3}{2}L$

9) The Bohr model of atoms

- A) Assumes that the angular momentum of electrons is quantized.
 B) Uses Einstein's photoelectric equation.
 C) Predicts continuous emission spectra for atoms.
 D) Predicts the same emission spectra for all types of atoms


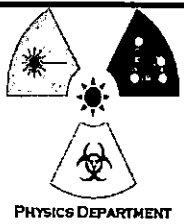
10) The electric charge in accelerated motion produces

- A) An electric field only B) A magnetic field only
 C) Electromagnetic radiation D) None of the above

EXAMINER

ASSOC. PROF. MOHAMED E SHAHEEN

أطيب التمنيات بالتوفيق و النجاح

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS		
	FINAL EXAM. FOR MATERIALSCIENCE(LEVELTHREE)		
COURSE TITLE:	Corrosion and Degradation of Materials	COURSE CODE: MS3242	PHYSICS DEPARTMENT
DATE:04 /01/2021	SEMESTER:SUM	TOTAL ASSESSMENT MARKS: 100	TIME: 2 HOURS

Answer the following questions:

Question [1] :

(25 Mark)

a-Discuss possible mechanisms for this type of corrosion (oxidation).

(11 Mark)

b- Write in details about the following :-

i- Influence of Concentration and Temperature on Cell Potential , and Scale Types of oxidation mechanism .

(14 Mark)

Question[2]:

(25 Mark)

a-Briefly explain:- The Standard emf Series - Corrosion rates.

(11 Marks)

b-Briefly explain two types for prediction of corrosion rates.

(14 Marks)

Question[3]:

(25 Marks)

a-Write in details about the following :-

Pitting corrosion - Galvanic corrosion.

(14 Mark)

b- Explain ,Calculation of corrosion rates.

(11 Mark)

Question[4]:

(25 Mark)

(a)Briefly explain the difference between oxidation and reduction electrochemical reactions.

(b) i-Put (✓) or (X) for the following and then correct the false: (11 Mark)

a-The site at which oxidation takes place is called the cathode oxidation is sometimes called an cathodic reaction.

b-Both oxidation and reduction reaction are necessary for corrosion to occur.

c-A potential of 0.870 V results for a copper-iron galvanic cell when the temperature is (57 F).

d-The potential difference for any galvanic cell depends upon only the two solutions.

e-The corrosion potential, E_{corr} is the closed circuit potential of a corroding metal.

f-The cell halves are separated by a membrane, which limits the mixing of the two solutions.

g-Erosion-corrosion arises from the combined action of chemical attack and mechanical abrasion or wear as a consequence of fluid motion.

2-In the following table, weight gain-time data for the oxidation of some metal at an elevated temperature are given.

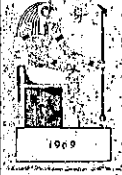
- a. Determine whether the oxidation kinetics obey a linear, parabolic, or logarithmic rate expression.
- b. Now compute W after a time of 900 min.

W (mg/cm^2)	Time (min)
4.8	20
9.6	40
11.2	80

(14Mark)

Examiner

Dr. Samy El-Attar.

	TANTA UNIVERSITY FACULTY OF SCIENCES DEPARTMENT OF PHYSICS			
	EXAMINER: <i>PROF. DR. RIYAD A.M. GHAZY</i>			
	TITLE:	<i>Laser Physics</i> <i>Physics & Biophysics Students</i>		CODE: MS3222
DATE:	30/12/020	TERM: SECOND	TOTAL MARKS: 200	PERIOD: 2 H ^{ES}

اجب عن جميع الأسئلة الآتية:

- 1- Proof that the laser action can be described in terms of two populations N_1 and N_2 and the number of photons in the laser cavity q ? Showing the threshold of the pumping rate?
- 2- a- Define the LASER and MASEK beam?
 b- Name and define the properties of the laser beam, explaining one of them?
- 3- Explain the interaction of light with matter in terms of Einstein's theory?
- 4- Explain WHY laser amplification and oscillation occur when the population is inverted in the active medium?

Riyad A.M. Ghazy

Riyad A.M. Ghazy