المستوى الثالث

جيو فيزياء

Answer the following questions
(Illustrate your answers with drawings whenever possible)

1) Differentiate between magnetic susceptibility (χ) and remanent magnetization (RM) tools used for stratigraphic investigations. (15 marks)

2) List five of magnetic susceptibility applications in geology and illustrate each one concisely (15 marks)

3) Describe the three climatic cycles that work on geologic time scale. How do they affect the magnetic susceptibility signal in marine sedimentary rocks? (20 marks)

2) Discuss the following:

a) Presentation of magnetic polarity stratigraphic data. (10 marks)

b) The Pliocene - Pleistocene geomagnetic polarity time scale. (10 marks)

c) Applications of magnetic polarity stratigraphy. (20 marks)

3. Read each of the following statements and mark either (✓) if correct or (X) if wrong: (10 marks)

a) Magnetic susceptibility can fossilize a record of the Earth's magnetic field. ( )

b) Ferrimagnetic minerals can carry a strong remanent magnetization. ( )

c) The intensity of remanent magnetization can be used to track back the transgression-regression (T-R) cycles throughout geologic times ( )

d) Magnetic excursion reflects the geomagnetic field variations over millions of years. ( )

e) *In a normal* polarity state the magnetic north pole lies close to the geographic north pole. ( )

f) In magnetic logging, oriented samples must be collected. ( )

g) In a magnetic susceptibility study, samples must be stepwisely demagnetized to isolate the primary magnetic records. ( )

h) The most complete record of the reversal pattern of the geomagnetic field since 160 Ma is preserved in the continental crust. ( )

i) Magnetic isochrones have been used as the main source of information in the construction of the Paleozoic GPTS ( )

j) The most precise part of the GPTS is that for the Early Mesozoic time span. ( )

| EXAMINERS | PROF. ABDELAZIZ L. ABDELDAYEM | PROF. SHADIA T. EL-KHODARY |
| | DR EMAD I. EL-FAR | |

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF GEOLOGY			
	EXAMINATION FOR JUNIORS STUDENTS OF GEOLOGY			
	COURSE TITLE:	SUBSURFACE GEOLOGY		COURSE CODE: GE3204
DATE:	JUN., 2017	SEMESTER: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions (Sketch maps and diagrams should be drawn whenever possible):

(1) What is a log and why the logs are important for petroleum engineers?   **(10 Marks)**

(2) Write on the followings: **(30 Marks)**
   a- Criteria for subsurface normal faults.
   b- Conventional resistivity logs.
   c- Nile Delta basin.

(3) What are the reasons behind the following features: **(18 Marks)**
   a- Facies change of certain stratigraphic sequence.
   b- Variation of sand / shale ratio in lithofacies map.

(4) Discuss the following subjects: **(30 Marks)**
   a- Prospecting and exploration of economic deposits.
   b- Methods for lithologic correlation.
   c- Ratio maps.

(5) Complete the following statements: **(12 Marks)**

   a- Structure contour maps are considered as ....map, they show ....
   ....and used to
   ....,................................. .

   b- Subsurface geology deals with.................................and interpreting such.........
   with respect to ....,................................,................................,.............................

   c- Tectofacies map shows...
   ....

   d-Variation of thickness of certain stratigraphic unit may be due to ....,
   ....,...................................and....................... .

   e- The simplest block diagram shows:... .

   f- Gravity Survey is useful in the fallowing subsurface aspects:1-.........................
   2-... 3-... .

EXAMINERS	PROF. DR.NADER EL GENDY	DR. SHADIA ABD EL REHIM

Answer the following questions (Sketch maps and diagrams should be drawn whenever possible).

Part I: (60 Minutes, Total Marks 50)

Answer of the following questions:-

1) Illustrate the airborne gamma-ray spectrometric survey. **(10marks)**

2) Describe the difference between: **(20marks)**

    a) Scintillometer and spectrometers.

    b) Constituents of the nucleus.

3) Write short notes on the radioactive minerals? **(10marks)**

4) What are the Sources of Radioactivity? **(10marks)**

Part II: (60 Minutes, Total Marks 50)

Answer of the following questions:-

Question 1: Discuss:-
    1-Wave Terminology *(10 degree)*
    2- Velocities of Seismic Waves in Rocks and velocity ratios *(10 degree)*

Question 2: Write about the followings: (Illustrate your answer).
    a) Seismic waves. *(10 degree)*
    b) Refraction method for prospecting (two- media case) *(10 degree)*

Question 3: Put (√) in front of the write sentence and (X) in front of the wrong sentence and correct the wrong one. *(7 degree)*

    a) Shear modulus, µ, sometimes referred to as the modulus of rigidity, is the ratio of shear stress to the shear strain. ( )
    b) The wavelength λ is the distance between two adjacent points on the wave that has the same phase or similar displacements. ( )
    c) The amplitude A of the wave is the maximum displacement associated with the particle motions that occur as the wave passes through the material. ( )
    d) Nearly all geophones currently used for seismic recording on land are of the electromagnetic type. ( )
    e) The sensitivity of an electromagnetic geophone depends on the strength of the magnet ( )
    f) The reflection method is used extensively for petroleum exploration ( )
    g) The period T is the time it takes for two successive wave crests to pass a reference point and, therefore, for the motion to complete one cycle. ( )

Question 4: Choose the correct answer *(3 degree)*

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باقي الأسئلة بالخلف

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Answer the following questhons :-

1- Derive the expression of the population inversion under steady-state oscillation ΔN_{th} as a function of transition probability $|\mu_{21}|$?

2- The laser beam has some special physical properties, write- down and give a short account about each of them?

3- Explain physically the laser action in terms of the rate equations theory?

4- Find the relationship between the gain coefficient G and the loss coefficient L_{eff} in the laser resonator?

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Part One: Write on the following, Illustrate your answer with drawing. (25 marks)

1-Types of wall rock alteration.   2- Late magmatic deposits.

3- Relation of contact metasomatism to intrusions and invaded rocks.

4- Cavity filling deposits.

5- General characteristics of simple and complex pegmatites, mineral paragenesis and criteria of replacement.

Part Two: Answer The Following Questions.

1-What are the differences between the following: **(24Marks)**

  a. Sedimentation and deposition.   b. Gypsite and gibbsite.

  c- Soda ash and salt cake.   d. Epigene and epigenetic

  e. Iron and manganese as a product of sedimentation.

2-Write on the following: **(16 Marks)**

  a. Cycle of Phosphate.   b. Calcium sulphate deposition.

  c. Requirements of residual concentration process.

  D. Commercial bauxite.

3-Answer the following with drawing only: **(10 Marks)**

  a. Different shapes of bauxite deposits.   b. Fence diagram.

  c. Residual manganese deposits.

  d. Oxidation and supergene enrichment.

Examiners: **Prof. Ibrahim Salem**   **Prof. Bothaina El-Desoky**

Answer the following questions:

1- Explain and deduce the terms of specific binding energy by using the liquid drop model. **(25 Marks)**

2-a) By using successive decay, obtain the number of daughter radioactive nuclei. **(15 Marks)**

b) The activity of radioactive material decrease by 8 in time (30 d).Calculate the decay constant and mean life time. **(10Marks)**

3-a) Draw the energy states and Compute the spin and parity for these nuclei in ground state and find isospin for nuclei $_7N^{16}$, $_8O^{19}$, $_{13}Al^{26}$ **(15Marks)**

b)Calculate the binding energy of α-particle in the nucleus $_8O^{16}$. **(10Marks)**

4-a) Prove that all nuclei have approximately the same density . **(10Marks)**

b) Calculate the atomic masses of $_{61}Pm^{147}$, $_{62}Sm^{147}$,hence show that Pm^{147} decays by β^-_{max} emission and calculate the energy of β^-_{max} **(15Marks)**

B.E($_{61}Pm^{147}$)=1217.85MeV,B.E($_{62}Sm^{147}$)=1217.29 MeV

Hint:N_A=6.023x10^{26}(kg mol)$^{-1}$,M($_8O^{16}$)=15.994915u,M(P)=1.007825 u

M(n)=1.008665 u , M ($_2\alpha^4$) =4.002603u , Radius of nucleon r_0=1.4 F.

EXAMINER	Prof. Dr.Neima Zakaria Darwish

☺ أطيب التمنيات بالتوفيق ☺

		Tanta university Faculty of Science DEPARTMENT OF PHYSICS		
		EXAMINATION FOR (FOURTH YEAR) STUDENTS OF PHYSICS		
			Radiobiology 2	
DATE	24/5/2017	TERM: second	TOTAL ASSEAAMENT MARK:	TIME ALLOWED: 2h

ANSWER ALL THE QUESTIONS:

Question (1)

a) List and describe in words the 4R's impacting cellular survival with fractionated radiation as a function of time.

b) Draw and label the radiation dose-rate effect on the cell survival curves.

Question (2)

1) TRUE or FALSE – Cells are most sensitive to radiation during S phase compared to G1, G2 or M.

2) TRUE or FALSE – G2 and M cell cycle phases have similar radiation sensitivities.

3) TRUE or FALSE – The effects of high LET on radiation survival varies little with phases of cell cycle.

4) TRUE or FALSE – Potentially lethal damage (PLD) repair can be modified by the post-irradiation conditions.

5) TRUE or FALSE The Oxygen Enhancement Ratio(OER)increases as a function of Linear Energy Transfer (LET).

6) TRUE or FALSE – The absence of oxygen (hypoxia) dramatically increases radiation sensitivity.

7) TRUE or FALSE – Relative Biologic Effectiveness (RBE) depends on radiation quality (LET) but is independent of radiation dose and

dose-rate.

8) TRUE or FALSE – An inverse dose-rate effect has been observed to cause more cell killing from lowering the dose rate.

9) TRUE or FALSE – Variation of radiosensitivity in different cell cycle phases has little effect on fractionated radiation therapy.

10) TRUE or FALSE – Tumors have both chronic and acute regions of hypoxia that can affect radiation sensitivity.

11) TRUE or FALSE – Wilhelm Conrad Röntgen won the 1903 Nobel Prize in Physics for the discovery of naturally occurring radioactivity.

12) TRUE or FALSE – Marie Curie, Pierre Curie and Henri Becquerel shared the 1901 Nobel Prize in Physics for the discovery of a "new kind of ray" emitted from gas discharge tubes that blackened photographic plates in light-tight containers.

13) TRUE or FALSE – There is no detectable difference between a 100keV x-ray and a 100keV gamma-ray except in the way they were produced.

14) TRUE or FALSE – The S.I. unit for radiation absorption dose is the rad which corresponds to the energy absorption of 100 erg/g.

15) TRUE or FALSE – A whole body radiation dose of 4Gy is lethal to humans due to unequal deposition of energy equivalent to the energy absorbed while sipping a warm cup of coffee.

16) TRUE or FALSE – The highly reactive hydroxyl radical (OH·) is estimated to cause two-thirds of the damage to DNA in mammalian cells from x-rays.

17) TRUE or FALSE–Non-homologousendjoining(NHEJ)repair of DNA double strand breaks occurs in all but G1 phases of cell cycle.

18) TRUE or FALSE – Chromosomal changes resulting in symmetric translocations and small deletions are lethal to the cell.

19) TRUE or FALSE – The linear-quadratic model assumes there are two

components to cell kill, one that is proportional to dose and one that is proportional to the square of the dose.

20) TRUE or FALSE – In radiation biology, the most critical concern of energy absorption from photon interactions with soft tissue is the photoelectric effect.

21) TRUE or FALSE – Alpha particles have a lower LET compared to photons.

Question (3)

a) Describe the difference between direct and indirect action of ionizing radiation.
b) Describe (words and/or diagram) the creation of a double strand break on a DNA molecule by a one-hit process (alpha-type cell kill).
c) Describe (words and/or diagram) the creation of a double strand break on a DNA molecule by a two-hit mechanism (beta-type cell kill).

Question (4)

1. Cells under conditions of hypoxia are:

A. Radiation resistant compared to oxic cells

B. Have equal radiation sensitivity compared to oxic cells

C. Radiation sensitive compared to oxic cells

2. The S.I. unit of absorbed dose is

A. Becquerel B. Sievert C. Gray D. Roentgen

3.Which of the following are not charged particles?

A. Electrons

B. Neutrons

C. Protons

D. Heavy ions

E. Alpha particles

4. Which of the following is true about the oxygen enhancement ratio (OER)

a) Is the same at all levels of cell survival
b) Can be measured by pulse field gel electrophoresis after a single high dose irradiation

c) Is the ratio of doses needed for an isoeffect in the absence to the presence of oxygen

d) Is low for cells in S cell cycle phase compared to cells in G2/M phase

5. Sublethal damage (SLD) repair is

A.   Equivalent to PLD repair

B.   Responsible for the radioresistance of certain types of tumors

C.   One reason for an early increase in cell survival observed when a radiation dose is split into two fractions separated by a time interval (D/2 – time – D/2) ·

D.   typically decreased as the time interval between two dose fractions is increased (D/2 – time – D/2) ·

6. Cells use pro-enzyme proteases called caspases to undergo which cell death process?

A. Necrosis B. Mitotic Cell Death C. Apoptosis D. Senescence

7. Irradiation with x-rays of HeLa and Chinese hamster cells harvested at mitosis has shown that the cells are most sensitive when they are:

A. in the M phase of the cell cycle

B. in the G1 phase of the cell cycle

C. in the G2 phase of the cell cycle

D. in the S phase of the cell cycle

8.Which of the following statements is TRUE?

A. Cells in the S phase are extremely radiation sensitive compared to G1 or G2 phases

B. Cells in the S phase are extremely radiation sensitive compared to M phase

C. Cells in the G2 phase have a similar radiation sensitivity to those in S phase

D. Cells in the G2 phase have a similar radiation sensitivity to those in M phase

9. The lethal lesion caused in DNA by low LET ionizing radiation is

A. A clustered event 15-20 nucleotides in size

B. Caused by base-damage events

C. Does not correlate with chromosomal aberrations

D. Due to oxygen fixation

10. Approximately how many DNA double strand breaks are caused per cell per Gray?

A. 3-4

B. 30-40

C. 300-400

D. 3000-4000

First question (20 marks) write not more 40 words on one only of the following:

1- What is radon?
2- Elastic scattering of gamma radiation with matter.
3- Gravitational radiation
4- ALARA
5- Synchrotron radiation.
6- The difference between ionizing and nonionizing radiation
7- The manmade radiation.

Second question (20 marks) write the relation and units of each of the following expression:

1- Exposure, Dose, Equivalent dose and Activity.
2- Total mass stopping power.
3- The total electromagnetic power **P** radiated.
4- The linear attenuation coefficient
5- Conservation laws of scattering.
6- Threshold energy.
7- Range

Third question (20 marks) what we mean by?

1- Radioactivity.
2- Compound nucleus.
3- Types of directly ionizing radiation
4- Production of radiation
5- Cyclotrons.
6- Isodiapheres, and Isosters

Examiners : Pof. Khaled M. Omar + Prf. Mohsen M. Bearcat

Code table

Code	Sentences
1110	Radon which cannot see or feel
1120	Cosmic or space radiation
1130	Terrestrial radiation
1210	Absorbed dose
1202	Equivalent dose.
1203	Effective dose
1204	Dose limits
12121	Slightly deflected.
12122	Virtually stopped
12131	The fare distance it will travel and the density of ionization along its track.
01251	Gray or Rad
01112	Half- value layer which describes the thickness of the medium needed to attenuate the beam's. HVL=0.693/m
01182	Pair production occurs in photon ,beam. And the probability of this reaction increases with energy and its dependent on atomic number of the medium.
01193	Coherent scattering occurs invery low energy beam and high Z materials.
02022	For external beam exposure can be achieved by following the rules of time, distance, and shielding.
02042	The National Council on Radiation Protection and Measurement (NCRP) sets recommended dose limits.

Forth question (40 marks) rewrite the sentences and complete it using the following code table by writing the code only:

1- There are three principal area which make up natural sources of radiation. First area is ------. A second area of natural sources is ---- ------ or --------.

2- Absorbed dose is measured in

3- The term describes the relationship with beam intensity and distance from the source of a beam for photons as it travels through some medium is----

4- ----- describes the thickness of the medium needed to attenuate the beam's original intensity in half.

5- Pair production occurs in

6- The three principles od ALARA include:

7- In the coherent scattering interaction , the energy of the ejected photon is---- _____ than the incident photon.

8- The cu _____ tail is seen at the end of electron depth dose rves.

9- . what organization sets the recommended dose limit for radiation workers and the general public?

10- 2. Decay constant (λ) can be determined by dividing the element's half-life by

11- When ionizing radiation penetrates matter it deposits energy. Three different radiation doses are 1- --------,2------ ,3-----.

12- The energy of bremsstrahlung photons can range from nearly zero when particle is -------- up to a maximum equal to the full energy of incident then particle is --------

13- The rate at which a charged particle loses energy determines -----