Mansoura University Faculty of Science Physics Department El- Mansoura , Egypt		جامعة المنصورة كلية العلوم قسم الفيزياء المنصورة – مصر

Final Exam Second Semester ; 2016
Time : Two hours
Date : 18/5/ 2016
Mark: 60 Mark

Educational Year : level two
Subjects : Radioactivity
Course Code : phys.230

Answer the Following Questions:-

Q.1a) Choose and write the correct answers : (10 Marks)

1- Very large nuclei tend to be unstable because of :
a) attraction of protons for neutrons
b) repulsive forces between neutrons
c) attraction of electrons for positively charged nucleus
d) repulsive forces between protons

2- Nuclei $^{18}_{7}N_{11}$, $^{18}_{8}O_{10}$, and $^{18}_{9}F_{9}$ are called
a) isotopes b) isotones
c)isobars d) isomers

3-Why $^{12}_{6}C$ is stable nucleus ?
a) even-even b) A=2Z
c) N=Z d) All of these

4-If μ is the linear absorption coefficient and ρ is the density of the absorber. The
The μ/ρ would be
a) atomic absorption coefficient.
b) total absorption coefficient .
c) mass absorption coefficient .
d) absorption coefficient .

5- The range of alpha particles in air / range of alpha particles in the absorber is defined as
a) relative stopping power.
b) stopping power
c) relative energy .
d)average ionization

6- time interval in which the activity decreases by one-half would be
a) decay time b) mean time
c)average time d) half- life time

7- if an isotope has half-life of 30 years. How much of an original sample remains after 120 years?
a)1/16 b) 1/8
c) 1/64 d) 1/32

8- beta minus decay will occur whenever the mass of the parent atom is
a) smaller than the mass of the daughter atom.
b) greater than the mass of the daughter atom.
c) equal to the mass of the daughter atom.
d) all of these

9- consider the nucleus as liquid drop and a_2 is constant the surface energy E_S is given as
a) $a_2A^{2/3}$ b) $a_2 A^{1/3}$
c) $a_2 A^{3/2}$ d) $a_2 A^{4/3}$

10- the distance travel in the absorber by the charged particle from the source to the point where its kinetic energy is zero would be
a) range b) distance
c) mean free path d)average distance

Q.1b) Discuss the following : [10 Mark]

a) radioactive equilibrium.

b) The neutrino hypothesis .

Q.2a) Complete the following decay processes by adding the missing decay particles ($\alpha, \beta, \gamma, \nu$) ,and write the name of the process . [10Marks]

1) ${}^{3}_{1}H \rightarrow {}^{3}_{2}H + ? + ?$

2) ${}^{7}_{4}Be + ? \rightarrow {}^{7}_{3}Li + \nu$

3) ${}^{12}_{6}C^{*} \rightarrow {}^{12}_{6}C + ?$

4) ${}^{210}_{84}PO \rightarrow {}^{206}_{82}Pb + ?$

5) ${}^{19}_{10}Ne \rightarrow {}^{19}_{9}F + ? + ?$

Q2.b) **Compare between the following nuclear reaction** [5 Marks]

a) photoelectric effect b) Compton effect

Q3) Answer the following Questions [15 Marks]

a)Consider a radioactive isotope undergo successive disintegration . Derive an expression for the number of daughter nucleus present at time t .

b) Consider the nucleus as liquid drop, what are the major effects that influence the binding energy of the nucleus?

Q4) solve the following problem:- [[10 Marks]

a) The half-life of ${}^{226}_{88}Ra$ is 1.6×10^{3} years. If the sample contains 3×10^{16} nuclei, determined the activity in curie.

b) What is the probability of a 661 kev photon interacting with water molecule?

Good Luck

MANSOURA UNIVERSITY
Faculty of Science
Geology Department
Mansoura–EGYPT

Date: Wednesday, 1st Jun **2016**
Academic year 2015/2016
Gphy 205- Final Exam
Time allowed: 120 min

Final Exam in GPR & Geothermal Exploration Second Level Geophysics Program

Instruction: Answer the following questions and stick to each question notification

QUESTION ONE: Write on each of the following: (20 Marks, 5 for each)

a) How deep can GPR "see" to locate targets
b) Magnetic Permeability (μ)
c) Modes of operation
d) Clutter

QUESTION Two: (10 Marks, 5 for each)

Rewrite the following sentences after doing the required correction(s), if exist

a) GPR can be utilized through ice, but it does not operate where salt water is present.

b) Dielectric permittivity ε, unit is H/m

c) Electromagnetic waves are composed of oscillating electric and magnetic fields at different angles to each other and both are parallel to the direction of propagation of the wave.

d) High frequency antennas have lower resolution and shallower depth penetration than low frequency antennas.

e) Skin depth is defined as the depth at which the amplitude decay to half of its original value.

$\delta = 5.31\ (\varepsilon_r)^2 / \sigma$

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QUESTION Three: Fill in the blanks (20 Marks, 1 for each blank)

1. The exploration of geothermal resource is different from the hydrocarbon exploration for these reasons:----------(1), ----------(1), and ----------(1)
2. Geothermal resources in Egypt is mainly controlled by two main systems ---------- (1) and ---------- (1). One of these systems is mainly controlled by the geology and ---------- (1) of the Gulf of Suez while the other is represented in ---------- (1) where many flowing hot springs are encountered.
3. Ideal geothermal system requires ---------- (1), ---------- (1) and ---------- (1).
4. Geothermal resources represents in Western Desert like ---------- (1), Farafra, and ---------- (1), oasis.
5. The geothermal resource of Egypt can be classified as three main types; ---------- (1), ---------- (1) and ---------- (1)
6. The direct methods give information on parameters that are influenced by ---------- (1), while the structural methods give information on ---------- (1) which may reveal structures or geological bodies that are important for the understanding of the ---------- (1)
7. Egypt's best-developed wind region so far is ---------- (1),while Egypt's only major solar power project was commissioned in ---------- (1)

QUESTION Four: Check if the following sentences are right or not and correct the wrong sentence: (10 Marks, 5 for each)

1. An ideal conventional geothermal system requires heat, permeability, and water and trap. ( )
2. The important physical parameters in a geothermal system are; temperature, porosity, permeability, salinity and resistance. ( )
3. Self-potential and seismic are examples of direct geophysical methods in exploring geothermal activity. ( )
4. Indirect geophysical methods such as gravimetric methods explore the physical parameters of the geothermal system. ( )
5. Egypt is recognized as having some of the world's best wind resources, especially in the Gulf of Suez area. ( )

With Success

Prof. Hamdy Seisa

Dr. Lamees M.

8. Microseisms interfere with records of ..... events, while cultural noise affects records of ..... events. ((a) regional, (b) near, (c) distant, (d) teleseismic)
9. The amplitude of seismic waves can range from few ..... to tens of ..... ((a) micrometers, (b) millimeters, (c) centimeters, (d) meters)
10. Earthquakes within the oceanic crust will not show ....., and first arrivals will be ..... or ..... ((a) Pg, (b) P*, (c) Pn, (d) P_b)
11. Seismic waves from low-magnitude local earthquakes are recorded by ..... seismographs. ((a) short-period, (b) intermediate-period, (c) long-period, (d) broad-band)
12. The direct P reflected once from the free surface is called..... ((a) PP, (b) PPP, (c) pP, (d) pPn)
13. ..... is S-wave reflects from the core-mantle boundary. ((a) ScS, (b) SmS, (c) SiS, (d) Sc)
14. S-waves that traverse the inner core as P are referred as ..... ((a) SKIKS (b) SKSKS, (c) SKJKS, (d) PKSKP)
15. ..... are PKP waves once reflected from the free surface back to the station in the same hemisphere as the focus. ((a) P`P`, (b) PKP_1, (c) PKP_2, (d) PKPPKP)
16. An Airy phase is characterized by ..... frequency compact wave train. ((a) decreasing, (b) constant, (c) increasing, (d) variable)
17. The instrument which measures the amount of ground motion is called a ..... ((a) seismoscope, (b) seismograph, (c) seismometer, (d) accelerometer)
18. If the seismometer natural period greatly exceeds the ground motion, its response is proportional to the ..... of the ground. ((a) acceleration, (b) velocity, (c) displacement, (d) time)
19. Precursory phenomena in the epicentral area of the predicted large earthquake include variation in..... ((a) radon gaz emission, (b) VP/Vs ratio, (c) electrical resistivity, (d) microearthquakes)
20. In the seismic cycle, the preseismic phase corresponds to the period of ....., and the coseismic phase to the period of ..... ((a) foreshocks, (b) aftershocks, (c) mainshock, (d) swarms)

<u>Q3. Complete</u>: (20 degrees; one for each statement)

1. ..... is the diffracted P wave.
2. ..... is the S wave reflected back to mantle as P from the discontinuity at 650 km depth.
3. ..... is S wave traversed the outer and inner core as P, and back again to mantle as S wave.
4. ..... is S wave reflected from the Moho as P wave.
5. Earthquake effects include primary effects as... ..., secondary as ....., and tertiary ones as ... .
6. For surface waves, ... is the velocity with which a wave with a single frequency propagates.
7. For surface waves, ... is the velocity of travel of the wave train envelope.
8. ..... are a number of earthquakes take place in the epicentral area preceding the main shock.
9. The response of the seismometer is proportional to..... when its natural period is equal to that of the ground motion.
10. The amplitude of surface waves is inversely proportional to the .....of the propagated distance.
11. The..... earthquakes occur along plate margin, while..... earthquakes occur within the plate itself.
12. ..... is a depth phase that leaves the focus upward as P, is reflected at the free surface and continues further as Pn along Moho.
13. .....is the shear wave traveling along the Conrad discontinuity boundary.
14. The common microseismic noise has periods of about..... sec.
15. t_{PP}-t_P is strongly dependent on ....., while t_{pP}-t_P is strongly dependent on .....
16. LR waves usually show the largest amplitudes on the ..... component, and LQ waves are best displayed on the ..... component.
17. When ts-tp is < 25 sec, the first arriving phase is .....
18. ..... is the shear wave traveling within the granitic layer.
19. The short-period S waves multiply reflected between the free surface and Moho interfere with each other and give rise to a wave group labeled .....
20. In order to make the seismometer indicate the ground motion accurately, it is necessary that the rate at which the pendulum returns to its rest position be very .....