المستوى الثانى - جيوفيزياء - ف ٢٠١٣
زكاة الزراعة هندسة

Mansoura University Faculty of Science Geology Department Second Term Exam 29/05/2013		Subject: Geophysics (203) كود المقرر (جف 203) Course: Earthquakes & Eq Engineering المستوى الثانى Time: 2 hours Full Mark: 60

هام: الإمتحان على صفحتين

Answer these THREE questions: (20 Marks for each question)

Q1. Complete: (20 Marks; one for each statement)

1. ScP is -------
2. pPS is -------
3. P650S is -------
4. SKIKP is -------
5. PKJKS is -------
6. The distance range ------- is called the shadow zone for S-waves.
7. ------- phase is characterized by a constant frequency compact surface wave train.
8. The Love mantle wave is labeled as -------, while Rayleigh mantle wave is labeled as-------
9. To detect surface waves, seismographs with free periods about ------- seconds are widely used.
10. Earthquake risk is defined as -------
11. For surface waves, the phase velocity is defined as -------
12. Amplitudes of direct P-waves are highly decayed beyond -------
13. The distance range ------- is called the shadow zone for P- waves.
14. The seismometer indicates clearly ground motion with periods ------- compared with its natural period.
15. The response of the seismometer is proportional to ground acceleration when its natural period is very ------- compared to ground motion.
16. The --------- indicates only the occurrence of an earthquake.
17. The seismic cycle has four basic phases; -------, -------, -------, -------
18. ------- phases are very useful in discriminating nuclear explosions detonated beneath oceanic islands and tectonic earthquakes.
19. The -------- extends between 100 and 250 km depths where rocks are partially molten.
20. Earthquake effects include primary effects as --------, secondary as ---------, and tertiary ones as --------.

Q2. Put Yes or No and correct the underlined word if it is false: (20 Marks; one for each statement)

1. Earthquake foci may be shallow, intermediate or deep but the most dangerous are deep earthquakes.

2. The velocity of propagation of scattered waves depends on its frequency.
3. The seismic waves showing a decrease amplitude at large distances, due to concentration (focusing) of energy.
4. The cultural noise has dominant frequencies above one Hz.
5. S waves are affected by scattering less than P waves.
6. The direct P- and S-waves are called elementary waves.
7. SKP is weaker on vertical component than PKS.
8. The amplitude of surface waves is inversely proportional to the square root of the propagated distance.
9. Amplitudes of surface waves decrease exponentially with depth.
10. LQ waves propagate slower than LR waves.
11. tPP-tP is strongly dependent on depth, while tpP-tP is strongly dependent on focal distance.
12. 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 fast.
13. The cultural noise affects records of near (local) earthquakes.
14. The common microseismic noise has periods of about six sec.
15. The microseisms interfere with records of distant (teleseismic) earthquakes.
16. All stylus-type recorders have the disadvantage of friction between the stylus and the drum.
17. For detection of P and S waves, seismographs with free periods about one minute are common.
18. For surface waves, the group velocity is the velocity of travel of the wave train envelope.
19. Strain seismometers measure the relative displacement of two points in the ground.
20. 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 Rg.

Q3. Write on OR Compare between: (20 Marks; 4 for each topic)

1. Structural engineers search how the ground is likely to shake near to the source, explain.
2. Write on the precursory phenomena of large earthquakes.
3. Write on the Dahshour seismic zone.
4. Compare between lithosphere and asthenosphere.
5. Compare between continental and oceanic crust.

لجنة التصحيح: أ. د. عبد القادر زلطة أ. د. عادل جنيدى أ. د. ابراهيم كرات* د. شعبان مشعل

المستوى الثانى - جيوفيزياء - جف٢٠٢ طرق التنقيب التثاقلية

Mansoura University **Faculty of Science** **Geology Department** **Second Term Exam** **02/06/2013**		**Subject: Geophysics (2٠2) (٢٠٢ كود المقرر(جف** **Course: طرق التنقيب التثاقلية** **المستوى الثانى** **Time: 2 hours** **Full Mark: 60**

هام: الإمتحان على صفحتين

Q1. A) Answer with YES or NO and Comment (15 Marks, 1½ for each):

1- Anticline has a constant anomaly along the direction of its long axis.
2- According to Airy theory, the higher the mountain the shallower will be its root.
3- The profile method for density determination gives information on densities at relatively deep depths.
4- The value of gravity anomaly is affected by the depth of body and its density contrast.
5- Bouguer anomalies over oceanic areas are strongly negative.
6- Elongated gravity anomalies indicate circular structures.
7- Gravity anomalies which are used in oil exploration represent the earth's total field.
8- In granite structure, the gravity anomalies are used to estimate the depth extent.
9- The densities of sedimentary rocks increase with depth.
10- In gravity interpretation, if densities are known, the determination of other parameters of geological bodies becomes faster.

B) Write Briefly on TWO only, illustrate with drawings (٥ Marks, 2½ for each):

1- Ambiguity in gravity interpretation.
2- Depth of compensation.
3- Effects of simple shape masses on gravity anomalies.

Q2. A) <u>Match between (i) and (ii)</u> (10 Marks, 1 for each):

(i)	(ii)
1- By applied Airy theory, it is found that	1- exhibit contrasts in density with respect to surrounding formations.
2- In gravity method, to reach the final solution of geological shape,	2- the greater gravitational attraction.
3- Condensing mass slab to thin sheet,	3- characterized by distinct asymmetry.
4- Gravity gradient ordinary indicated	4- Moho acts as mirror image for surface topography.

10- Flattening of the earth at the two poles is	10- it depends on mass and depth.
	11- of the fault trace is half total value.
	12- slightly less than the equatorial.
	13- over the ridge crests.

B) Write Briefly on FOUR only, illustrate with drawings (10 Marks, 2½ for each):

1- Estimates of depth and mass by gravity method.
2- Adjustment for drift.
3- Gravity profile of horizontal slab shape (Fault and step-like structure).
4- Examples of salt dome using gravity method.
5- Pratt's theory of isostasy.

Q3. A) Complete the following and comment your answer (15 Marks, 1½ for each):

1- Theoretical of masses distributions at different depths are due to ------ and size.
2- The center of mass axis through the earth changes continuously with moon's -------.
3- Isostatic anomaly can be deduced by computing the gravity effect from ------ masses distribution.
4- Worden gravimeter is ------ apparatus.
5- Terrain correction is made to remove the effect of …… around the station.
6- From wells, it can be determined density by ------- method.
7- Downward continuation is used to determine the ------- subsurface structure.
8- Magnitude and form of gravity anomaly can be deduced from -------.
9- Depth to center of cylinder shape is ---------.
10- Iterative techniques are indirect methods of translating gravity data into -------.

B) Write Briefly on TWO only; illustrate with drawings (5 Marks, 2½ for each):

1- Geoid.
2- Airy's model for isostasy.
3- Gravity anomalies of rift vallies and sedimentary basins.

لجنه التصحيح: أ. د. محمد رفعت شريف* أ. د. عبد القادر زلطة أ. د. صلاح البيلى أ. د. عبد الحميد طه

المستوى الثانى - جيوفيزياء - طبقات عامة ٢٠١٣

Mansoura University
Faculty of Science
Geology Department
Course Title: General Stratigraphy
Code: (G 206)
Full marks: 60

Second Semester (May 2013)
2rd level, Geophysics
Time: 2 hours
Date:5/6/2013

أجب عن الأسئلة الثلاثة التالية :

السؤال الأول: أجب عن الآتى (٢٠ علامة)

أولا: أذكر المرادف الطباقى باللغتين العربية والإنجليزية (٦ علامات):

١- وحدة متجانسة حجريا, قابلة للتخريط الجيولوجى, وذات وضع طباقى.

٢- مجموعة طبقات متوافقة ومتعاقبة ومتحدة المنشأ يحدها سطحا عدم توافق.

٣- وحدات طبالقية لم تسم أصلا بطريقة رسمية كأن تقع بين طبقتين دليليتين.

٤- وحدة طباقية رئيسة من صخور نارية لا تستجيب لقانون تعاقب الطبقات.

٥- تكوين من الحجر الرملى فى منطقة ريسان عنيزة.

٦- تغيير وجهة النظر حول محتوى الوحدة الطباقية دون المساس بحديها ورتبتها.

ثانيا: بالرسم فقط عبر عن أربعة فقط من الآتى (٨علامات):

1- Nonconformity.
2- Succession of marine transgression.
3- Oppel Zone.
4- Calibrating the geologic time.
5-Depositional Sequence.
6- A unit Stratotype.

ثالثا: ضع فى جدول اثنين فقط من الآتى (٦علامات):

١- ترتيب وحدات الطباقية الزمنية (Chronostratigraphic units).

٢- الدورات الطباقية (Stratigraphic cycles) وأسبابها المفترضة.

٣- البنيات الرسوبية الأولية(Primary structures)المفيدة فى تحديد قمة وقاع الطبقة.

السؤال الثانى: أجب عن الآتى (٢٠ علامة):

أولا: أكتب نبذة مختصرة ووافية عن أنواع المضاهاة الحجرية والحياتية والزمنية
(١٠ علامات)

ثانيا: أي الجمل صحيح وأيها خطأ (١٠ علامات) :

١- الكمبرى المبكر (Early Cambrian) من وحدات ال Chronostratigraphic units.
٢- الوحدة الطباقية المتجانسة صخريا والتى لا بد من أن تكون قابلة لأن توضع على الخرائط الجيولوجية المعتادة هى العضو: (Member).
٣- التكوين الذى يحمل اسم الحجر الجيرى الأبيض الإسناوى (Esna white limestone). يمثل اسما رسميا.
٤- قسم الزمن الجيولوجى إلى ثلاثة أقسام رئيسة هى أزمنة الحياة الخفية والمتوسطة والظاهرة وكل منهم يحمل رتبة Eon.
٥- نطاق المصنف الحفرى يعرف بوجود وفرة غير عادية لمصنف أحفورى أو أكثر.
٦- تطورت نظرية الألواح البنائية عن نظرية الزحف القارى.
٧- الوحدات المختلفة زمنيا تسمى Diachronic units.
٨- المضاهاة الزمنية تستخدم الأحداث الترسيبية قصيرة العمر وحدث تقدم وتراجع البحر.
٩- قاطع ينتمى عمره إلى العصر الطباشيرى قطع صخور البرمى.
١٠- الوحدة الحجرية المسماة بالليثوديم غير قابلة للتقسيم.

السؤال الثالث: أجب عن الآتى (٢٠ علامة):

أكتب نبذة مختصرة عن:

١- مرتكزات الطباقية الحياتية (١٠علامات).

٢- المبادئ الأساسية المستخدمة للطباقية والمستخدمة أيضا فى تحديد الأعمار النسبية للطبقات. (١٠ علامات).

المصححون: أ . د . صلاح نصر عياد و أ. د. حسنى حمدان*

المستوى الثانى - جيوفيزياء - طرق التنقيب الكهربية ص ٤٠

MANSOURA UNIVERSITY
Faculty of Science
Geology Department
Mansoura-EGYPT

Date: Sunday, 09 June **2013**
Final semester –Academic Year 2012/2013
Full Mark: 60
Time allowed: 2 Hours- *(09.00-11.00 reading time)*

B. Sc. Exam in GPHY-204 (Electric Prospecting) for Geophysics Program (Credit Hours Board)

Electric Prospecting (Relating to material taught by Dr. Mohammed Awad Ahmed)

Instruction: Answer All the following questions: Q1 (28.3%) (A, B and C), Q2 (45%) (A and B), and Q3 (26.7%)
In your answers use labeled diagrams and provide specific, named examples wherever possible. No aids allowed.

Q1 (28.3%): **(17 Marks)**

Q1-A: Choose the correct answer **(5 Marks)**

1) The ...**(1)**... (electrochemical potential –electrokinetic potential – mineral potential) is directly dependent upon the concentration differences and temperature.

2) In IP survey, the measurement of a decaying voltage over a certain time interval is known as .....**(2)**..... (frequency domain IP - spectral IP- time-domain IP –phase domain IP) surveying, while measurement of apparent resistivity at two or more low AC frequencies is known as .....**(3)**.....(time domain IP - phase domain IP – spectral IP - frequency-domain IP) surveying.

3) In the case of ...**(4)**..... (Wenner array – Schlumberger array – Dipole dipole array) the potential electrodes are placed at a fixed spacing which is no more than one-fifth of the current-electrode half-spacing.

4) The signal-contribution contours for the Wenner and Schlumberger array are near .....**(5)**....(vertical – flat – lateral) indicating they locates .....**(6)**.....(vertical – horizontal – dipping) interfaces more accurately.

5) The SP anomaly of a graphite body is less than .....**(7)**..... (-150 mvolt, -250 mvolt, +60 mvolt) while the sign of the Pegmatite is .....**(8)**..... (negative – positive).

6) In the Qualitative Approach, If the resistivity of the intermediate layer is less than the resistivities of the upper and lower layers the apparent resistivity curve is .....**(9)**...(basin-shaped – bell shaped – symmetrical).

7) In time domain IP survey, one measure of the IP effect is the ratio Vp/Vo which is known as the .....**(10)**..... (Metal Factor – Apparent Chargeability – Chargeability), and is usually expressed in terms of mill volts per volt or percent

Q1-B: Which method can be applied in the following cases **(6 Marks)**

1) Location of buried foundations
2) Disseminated sulphide ore bodes
3) Archaeology
4) Geothermal
5) Location of buried foundations
6) Detection of saline groundwater

Q1-C: What these abbreviations mean **(6 Marks)**

1) CST	2) MF	3) CVES	4) Ma
5) ERT	6) PFE	7) SP	8) MRT
9) FE	10) IP	11) VES	12) SSI

لجنة الامتحان و التصحيح * | ا.د. محمود الشربينى- ا.د.عبد القادر زلطة- ا.د. احمد عبد اللطيف - د.محمد عوض.*

Q2 (45%): **(27 Marks)**

Q2-A: Complete the following **(23 Marks)**

1) The three ways in which electric current can be conducted through a rock are: ...**(1)** ..., ...**(2)** ... , and ...**(3)** ... .

2) The SP survey, in which the two porous pots electrodes are ...**(4)**... along the traverse, is called ...**(5)**..., where the potential difference measured is divided by the electrode separation to give a ...**(6)**... (unit **mV/m**).

3) The apparent resistivity is the value obtained as the product of a measured ...**(7)**... (**R**; units ...**(8)**...) and a ...**(9)**... (**K**; units ...**(10)**...) for a given electrode array.

4) The two causes of membrane or electrolytic polarization are the ...**(11)**... and ...**(12)**... .

5) The SP component that forms as a result of an electrolyte flowing through a porous medium is called...**(13)**..., and alternatively referred to as...**(14)**..., ...**(15)**... or ...**(16)**.... It tends to increase in positiveness with the direction of water flow as the electric charge flows in the opposite direction.

6) The two apparent resistivities measured in frequency domain IP survey are used to determine the ...**(17)**... (unitless), ...**(18)**... (units: %), and the...**(19)**... (or siemens/m).

7) The SP filed procedure that keep one electrode fixed at a ...**(20)**... on ground and to measure the ...**(21)**... (unit ...**(22)**...) between it and the second one is called the ...**(23)**... .

8) The four systems of induced polarization measurement are...**(24)**... , ...**(25)**... , ...**(26)**... and ...**(27)**....

9) Self-potentials are generated by a number of natural sources which are ...**(28)**..., ...**(29)** ... (...**(30)** ..., ...**(31)** ..., and ...**(32)** ...), and ...**(33)** ....

10) The VES quantitative interpretations are: ...**(34)** ..., ...**(35)** ... , ...**(36)** ..., ...**(37)** ... and...**(38)** ... .

11) The main mechanisms of induced polarization are ...**(39)**... and ...**(40)**....

12) SP anomalies are often interpreted qualitatively by profile ...**(41)**..., ...**(42)**... , ...**(43)**... (...**(44)**... or ...**(45)**...) and ...**(46)**....

Q2-B: Answer Yes or No **(4 Marks)**

1) In IP survey when using a variable low-frequency AC source, it is found that the measured apparent resistivity of the subsurface increases as the frequency decreased (.....)

2) In SP interpretation, If the ore body is inclined, the shape of the profile will become asymmetrical with the steepest slope and positive tail both lying on the down-dip side (.....)

3) The main application of IP prospecting is in the search for massive metallic ores (.....)

4) CST field curves can be interpreted qualitatively using simple curve shapes, semi-quantitatively with graphical model curves, or quantitatively with computer modeling (.....)

5) The effect of overvoltage increases with increasing porosity as more alternative paths become available for the more efficient ionic conduction (.....)

6) The effect of overvoltage increases with increasing porosity as more alternative paths become available for the more efficient ionic conduction (.....)

7) The magnitude of the electrode polarization effect depends upon both the magnitude of the impressed voltage and the mineral concentration (.....)

8) In IP survey, when using a standard four-electrode resistivity spread in a DC mode, if the current is abruptly switched off, the voltage between the potential electrodes does not drop to zero immediately (.....)

Q3 (26.7%): Write briefly on the following: **(16 Marks)**

1) Geophysical report on a resistivity survey. (4 Marks)

2) Plan and design a resistivity survey for groundwater investigations? (7 Marks)

3) Compare between (**CST**) and (**VES**) surveying (5 Marks)

BEST WISHES

Mansoura University
Faculty of Science
Geology Department
Date: 12/06/2013

Second Term Exam (June 2013)
Second Level (Geophysics)
Course No.G205
Course: Sedimentation & Sedimentary Rocks
Time: 2 hours Full Mark: 60

Answer the Following Questions

Question One : Tick (√) or (X) and correct

1- The breakdown of bedrocks is the main result of chemical weathering in the provenance.
2- The slope of cumulative is a function of grain size distribution.
3- The ripple index describes the forming current velocity.
4- The azimuth of cross-bedding points to the flow direction.
5- The laminated conglomerate belongs to the para types.
6- The lithic arenite is more mature than the feldspathic greywacke.
7- The whitish shale contains more than 70% silica.
8- Montmorillonite is the main constituent of the common shale.
9- The induration of silt produces mudstone.
10-The clay term has only size meaning.
11-The low Mg- calcite present only in older carbonate rocks.
12-The oolites are always smaller in size than pellets.
13-The micrite in carbonates is cement and sparite is matrix.
14-The fenestral porosity is characteristic to biosparite rocks.
15-Travertine is a type of biochemical carbonate rocks.
16-Phosphate rocks are accumulated in deep marine seas and then transported to shallow one.
17-The BTU of bitumine is about 6000.

(17 marks)

Question Two: Complete

1-The chemical reaction of water with minerals is.....
2-The effective porosity is ratio of.....to.....
3-The asymmetric ripple marks are formed by..... .while the symmetric by.....
4-The steeper side of the current ripples is.....while the shallower one is.....
5- The dip angle head of cross-beds points to.....while that of imbrication to.....
6- The grain movement by fluid flow is caused by.....and.....
7- The matrix of greywacke is composed of minerals.....,.....,.....and.....
8- The silica cement in quartz arenite present in the form of.....,.....and.....
9- The iron cement in ferruginous sandstones requires .....source and.....conditions.
10-The early formed carbonate minerals in biochemical limestones are.....and.....
11-The binding material in limestone are eather.....or.....
12- Folk's classification of carbonates depends on the percentages of.....,.....and.....
13- Diminution of sparite crystals is an example of.....neomorphism.
14-The stalactites and stalagmites are types of .....carbonate rocks called.....
15-The sequence of mineral precipitation from sea water is.....,.....,.....and.....
16-The main constituents of phosphatic rocks are .....,.....and.....minerals.
17-The different coal grades include.....,.....,.....,.....and.....

(17 marks)

Question Three: Choose the correct answer

1- Which of these rocks are not biochemical
a-tufa b- grainstone c- boundstone
2- Lamination of argillaceous rocks is caused by variations of
a- texture b-chemistry c- fossil content
3- Laminar flow is able to transport
a- gravel grains b- sand grains c-silt grains
4- Which of these rocks tend to be fissil
a- sandstone b- limestone c- shale

→

Prof.O.Hegab and Prof.A.Elshahat لجنة التصحيح:

5- Graded bedding is produced by deposition under
a- steady current b- tranquil current c- turbidity current

6- Which of the following sandstones is most likely to form by weathering of granite
a- quartz arenite b- litharenite c- arkose

7- Which separates layers of sedimentary rocks in the field
a- lithology b- hardness c- porosity

8- Which of these rocks is the least mature
a- fault breccia b-ortho conglomerate c-laminated conglomerate

9- Sandstone with framework composed of>25 feldspar,>30% rock fragments and >15%matrix is
a-lithifeldspathic wacke b- feldspathic wacke c- feldspalithic wacke

10- Sandstone contains<15% matrix ,and < 25% feldspar is
a- qurtz arenite b- feldspathic wacke c- subarkose

11- A coarse grained clastic rock contains quartz clasts and < 15% matrix is
a- paraconglomerate b- petromictic conglomerate c- oligomictic conglomerate

12-Limestone with >25% bioclasts, <25%oolites,and <25% pellets and cemented by sparite is
a- biosparite b- bioosparite c- bioopelsparite

13- Limestone with partially mud and partially grain supported is
a- wackstone b- packstone c- grainstone

14- A fissile black mudstone is
a- oil shale b- carbonaceous shale c- common shale

15- Pure chemically precipitated carbonate rock is
a-travertine b- boundstone c- grainstone

16- Peat is an organic rock containing
a- 50% C b- 75% C c- 95% C

17- The most common evaporate mineral precipitated in inland depressions is
a- natron b- gypsum c- anhydrite

(17 marks)

Question Four: Draw diagrams showing:

1- The rock cycle.
2- The mineral stability series.
3- The grain shape diagram of Zing.
4- The different porosity types of carbonate rocks.
5- The relation between grain size and distance of transport.
6- The different types of ripple marks.
7- The Bouma cycle.
8- The different types of cross-bedding.
9- The classification of sandstones. (9 marks)

Write the captions on each diagram

Good Luck

Prof. Omar Hegab

المستوى الثانى - جيوفيزياء - نشاط اشعاعى (ف ٢٣٠)

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

Final Exam Second Semester ; 2013

Time : Two hours | **Educational Year : level two**

Date : 19/6/2013 | **Subjects : Radioactivity**

Mark: 60 Mark | **Course Code : phys.230**

Answer the Following Questions:-

1- Complete the following decay processes by adding the missing decay particles $(\alpha, \beta, \gamma, \nu)$,and write the name of the process . **[20] Marks**

$a) {}^{11}_{6}C \rightarrow {}^{11}_{5}B + ? + ?$

$b) {}^{32}_{15}P \rightarrow {}^{32}_{16}S + ? + ?$

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

$d) {}^{240}_{94}PU \rightarrow {}^{236}_{92}U + ?$

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

Answer Two Questions Only From The Following :-

2-(a)Why the following items are corrected ? **[10 Marks]**

(i)The nuclear force is responsible for holding the constituents of a nucleus together .

(ii) There are radioisotopes among the elements with atomic numbers between Z = 81 and Z =92.

(b)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. **[5 Marks]**

(c) Compare between internal conversion and electron capture. **[5 Marks]**

3-(a)What are the factors governing the stability of isotopes? **[5 Marks]**

(b) In beta decay, what is the significant of the neutrino hypothesis? **[5 Marks]**

(c) Define the Half-life and the activity of the radioactive sample. **[10 Marks]**

4-(a)Write short notes on: Radioactive equilibrium-Radioactive dating. **[10 Marks]**

(b) Consider the nucleus as liquid drop, what are the major effects that influence the binding energy of the nucleus? **[5 Marks]**

(c)Calculate the binding energy of the deuteron ,the mass of the deuteron is 2.014102 u.(m_p=1.007276 u, m_n=1.008665 u) **[5 Marks]**

Good Luck

المستوى الثانى - جيوفيزياء - طرق التنقيب الإشعاعية والحرارية ج ف ٥٠

Mansoura University
Faulty of Science
Department of Geology

June, 16 2013
Time allowed: 2 hours
Full Marks: 60 marks

2nd term exam in GPR and Geothermal)

Answer the following three questions:

1- Write in details on each of the following: ***(20 marks, 10 for each)***

a) What is the ground penetrating radar technique? (i) How it can be used? (ii) Application fields of it? (iii) The advantage and disadvantage of it?

b) What are the processes by which heat can be transferred? What is the relative importance of each process in (i) the crust, (ii) the mantle, (iii) the outer core, and (iv) the inner core.

2- Define each of the following: ***(20 marks, 4 for each)***

a) Heat flow
b) Diffusivity
c) Temperature and heat
d) Thermal conductivity
e) Geysers

3 - Rewrite the correct sentences after doing the required corrects (if exist)

(20 marks, 2 for each)

a) Ocean floor spreading means the movement of the Earth's contents relative to each other by appearing to drift across the ocean bed.

b) The magnetism in the rocks as you move away from the mid-ocean ridge is a series of magnetic "stripes," normal, reversed, normal, reversed, and so on.

c) A hydrothermal vent is an opening in a planet's crust, often in the neighborhood of volcanoes, which emits steam and gases

d) Moho-discontuity is the rigid, cool part of the earth which contains the crust and the upper part of the mantle, while the lithosphere is the convecting part of the mantle which behaves like a plastic

e) Hot Dry Rock (HDR) geothermal system usually associated with one or more fluids

f) A high frequency GPR antennas will examine the surfaces at different depths and have different resolutions

g) The specific heat refers to the amount of energy released or absorbed by a substance during change of state that occurs without changing its temperature

h) eMv is the unit used for measuring energy of radioactive isotopes

k) Thermal conductivity SI units is Wm^2

l) Convergent plates are related to plate transform

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