



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018

Examination:- B.S. Applied Geology

Roll No. ....

**Subject: Communication Skills & Technical Report Writing**  
**PAPER: I / ENG-202**

**TIME ALLOWED: 3 Hrs.**  
**MAX. MARKS: 100**

**NOTE: Attempt All questions.**

**Q#1: Read the following passage and answer the questions that follow. /10**

Geology from the Greek geo (Earth) and logos (discourse) is that branch of physical sciences which deals with the study of the earth, including the materials that it is made of, the physical and chemical changes that occur on its surface and in its interior, and the history of the planet and its life forms. It also studies the ocean floor, and the interior of the earth. Geologists investigate the composition of earth materials and various geological processes to locate and exploit its mineral resources. They investigate geological phenomena such as earthquakes and volcanoes and attempt to predict and minimize their damaging effects.

Geology, or geoscience, is the study of the Earth. Not only do geologists address academic demands such as the formation and composition of our planet, the causes of earthquakes and ice ages, and the evolution of life, but they also address practical problems such as how to keep pollution out of groundwater, how to find oil and minerals, and how to avoid landslides. The complex science of geology is not a mere study of earth superficially, but it includes an inestimable amount of science which is involved in it from the present day climate change to even before the formation of the solar system as it contemplates on the origin of universe and solar system and has gained a great success in finding their original cause of formation along with the reason of the formation of the earth on the one hand and on the other hand has provided a significant evidence of the present day climate change, environmental degradation, air and water pollution as not being only an anthropogenic affair but beyond that .

This subject accumulates events that the Earth has witnessed for more than 4.5 billion years, like the formation of the mineral resources (the back bone of modern society), the origin and evolution of the life, the evolution of atmosphere, and causes of disappearance of so many great organisms from the earth as a function of the varying environment. This time-span of million years and associated events and their causes and consequences are preserved on the earth as the pages in a book. The fascination of geology attracts many to careers in this science. Tens of thousands of geologists work for oil, mining, water, engineering, and environmental companies, while a smaller number work in universities, government geological surveys, and research laboratories. Recent developments in geology have further broadened its expanses into medical and health sciences with a new emerging field of medical geology growing very fast. There are countless fields where geological knowledge is a prerequisite to achieve a technologically sound society.

i. What does geology help us understand about our planet Earth?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ii. Why do geologists investigate geological phenomena such as earthquake?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

iii. How geology is a study of past or history?

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iv. What kinds of career opportunities are available to geologists?

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v. Write the most appropriate title of the passage.

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Q#2: Read the text carefully and choose most appropriate word from the word bank. /10

**Word Bank:**

Mars crust crater miles	summit rock lava cracks	Magma Earth volcano erupts
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A volcano is a place on the Earth's surface (or any other planet's or moon's surface) where molten \_\_\_\_\_, gases and pyroclastic debris erupt through the earth's \_\_\_\_\_  
\_\_\_\_\_. Volcanoes vary quite a bit in their structure - some are \_\_\_\_\_ in the earth's crust where lava erupts, and some are domes, shields, or mountain-like structures with a \_\_\_\_\_ (a circular depression) at the summit.

\_\_\_\_\_ is molten rock within the Earth's crust. When magma \_\_\_\_\_ through the earth's surface it is called \_\_\_\_\_.

The largest volcano on Earth is Hawaii's Mauna Loa. Mauna Loa is about 6 miles (10 km) tall from the sea floor to its \_\_\_\_\_ (it rises about 4 km above sea level). It also has the greatest volume of any volcano on Earth, 10,200 cubic miles (42,500 cubic kilometers).

The largest \_\_\_\_\_ in our Solar System is perhaps Olympus Mons on the planet \_\_\_\_\_. This enormous volcano is 17 \_\_\_\_\_ (27 km) tall and over 320 miles (520 km) across.

**Q#3: For each question, fill the space in the sentence using the base word given in bold at the end. The required word may be a noun, adverb, adjective or verb or any other grammatical form. /10**

- i. Minerals influence and respond to physical, chemical, and biological processes ..... throughout the Earth. (**Operate**)
- ii. The study of the ..... of the rocks in the earth's lithosphere is the subject matter of the branch of geology known as structural geology. (**deform**)
- iii. Historical Geology is that branch of geology that studies the ..... history of the earth in a chronological manner. (**evolution**)
- iv. Engineering geology deals with the ..... of geology to engineering practices and solving engineering problems. (**apply**)
- v. Arabs were the first people along with romans to recognize the ..... of the surface processes. (**important**)
- vi. Eratosthenes, a librarian at Alexandria at about 200 BC, made surprisingly accurate ..... of the circumference of the earth by plotting the angles. (**measure**)
- vii. ....of geology as a separate branch of science took place in the years between 1775 and 1830. (**Develop**)
- viii. There are considerable opposition to the ..... method of calculating the ages of minerals and rocks, both from religious authorities and from physicists. (**geology**)
- ix. Physicists made the ..... that the earth began as a molten mass and was in process of cooling. (**assume**)
- x. According to a hypothesis, the sun existed before the formation of the ..... system. (**planet**)

**Q#4: Complete the following sentences either by adding a dependent clause or independent clause given in the options (a-e). /05**

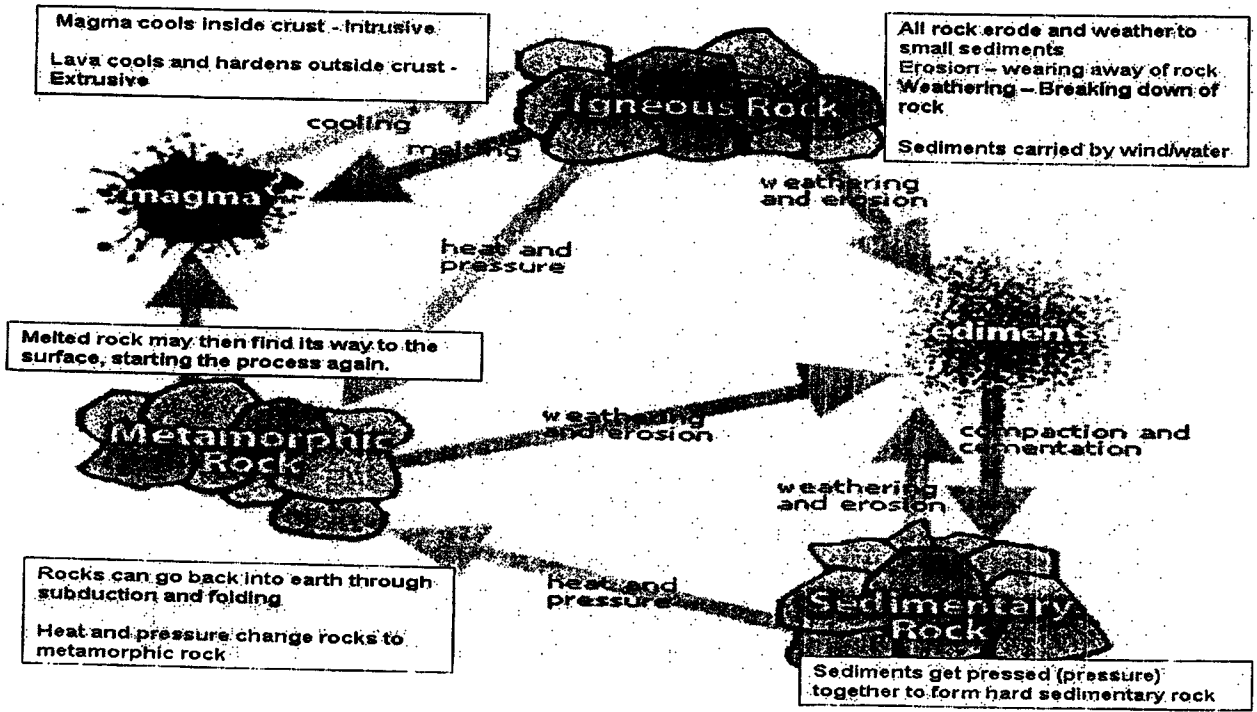
- i. As the larger star came closer and closer ..... and caused imbalance in the sun
  - ii. Igneous rocks are also called primary rocks .....
  - iii. The whole ideas of build the dam will become useless .....
  - iv. The ground may start to pitch .....
  - v. Although landslides usually occur on steep slopes, .....
- a. the size of the tides increased (due to increased gravitational attraction).
  - b. because these are formed on earth crust
  - c. if the foundation on which the dam is built is the porous or permeable
  - d. and roll likes a ship for several seconds to several minutes
  - e. they also can occur in areas of low relief.

Q#5: Complete the following comparison table of Fact and Opinion. /10

Sr#	Basis for comparison	Fact	Opinion
1.	Meaning		
2.	Based on		
3.	What is it?		
4.	Verification		
5.	Represents		
6.	Change		
7.	Words		
8.	Debatable		
9.	Influence		
10.	Example		

Q#6: Look at the following cycle of different rock formation and describe it in your own words.

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**Q#7: Look at the phonemes and decide which word it is. /5**

1. /k/ /æ/ /t/

- a) Cat            b) cut            c) kit            d) cot

2. /l/ /u:/ /p/

- a) Loop            b) lop            c) lip            d) leap

3. /b/ /əʊ/ /t/

- a) Boot            b) bat            c) bate            d) boat

4. /s/ /e/ /d/

- a) Sad            b) sod            c) said            d) sud

5. /d/ /e/ /t/

- a) Date            b) debt            c) duty            d) doubt

**Q. 8 Read the paragraph carefully and correct it technically in all aspects. (20)**

The salt range/Potwar Plateau (SRPP) are part of himalayan foreland and an important petroleum province in North Pakistan. The hydrocarbons is commonly produced from stacked cambrian to Eocene elastic and carbonate reservoirs which have an average thickness of 1 km. These strata are overlain by at least 5 km of Miocene and younger continental molasse sedimentation in the deepest part of the foreland basin. Surface and subsurface (seismic interpretations and borehole data) Geology combine with the timing and the patterns of sedimentation has allow to interpret the deformation as thin skinned, with a detachment in weak Eocambrian evaporates and the development of ramp-and-flat structures, since about 8 Ma. We have reviewed the structural interpretations with new borehole logs, field geology, and reserve estimates in this paper to precisely define oilfield structures with a view on future exploration. As a result of this work, 12 oil fields are classified as three detachment folds, four fault-propagation folds, four pop-ups, and one triangle zone structure. The latter two are identified as better prospects with the last one as the best with estimated reserves of 51 million barrels of oil (MMBO). Hence, the triangle zones along with other ramp-and-flat structures from the North Potwar Deformed Zone (NPDZ) are recognized to provide potential future prospects. Finally, a 40-km-long structural cross-section from NPDZ is used to discuss complex deformation of the triangle zone and duplex structures as future potential prospects. About 55 km of shortening across the NPDZ during Plio-Pleistocene time is calculated, which has important bearing on the geometry of prospects, reserve calculations, and the future exploration.

**Q. 9 Explain main contents of a technical report.**

**(20)**



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

Subject: Mathematics II  
PAPER: II / MATH-202

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 100

**NOTE: Attempt any FIVE Questions. All questions carry equal marks.**

1. Solve the following differential equations:

(a)  $(D^3 + 1)y = 1 + e^{-x} + e^{2x}$ . (10 marks)

(b)  $(D^3 - 4D^2 + D + 6)y = 0$ . (10 marks)

2. Solve the following differential equations:

(a)  $(D^3 + D^2 - 4D - 4)y = e^{2x} \cos 3x$ . (10 marks)

(b)  $(D^3 - 27)y = 0$ . (10 marks)

3. Given that  $\frac{dy}{dx} = \frac{1}{2}(x + y)$ ,  $y(0) = 0$ ,  $y(0.5) = 2.636$ ,  $y(1.0) = 3.595$ ,  $y(1.5) = 4.968$ , Find  $y(2)$  by Adam's Bashforth predictor method. (20 marks)

4. (a) Find a root of  $\sin x = 1 + x^3$  correct to 3 three decimal places using Newton Raphson method. (10 marks)

(b) Find a root of the equation  $\sin x = 5x - 2$  correct to three decimal places by bisection method in  $(0, 1)$ . (10 marks)

5. (a) Find the cube root of 2 by simple iterations. (10 marks)

(b) Find a root of  $2x^3 + 4x^2 - 3x - 5$  near to 1.0 correct to three decimal places by simple iterations method. (10 marks)

6. (a) Show that

$$\int_0^{+\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$$

(10 marks)

(b) Find the inverse Laplace transform of

(10 marks)

$$\frac{s + 4}{s^2 + 3s + 2}$$

7. (a) If  $f(t)$  and  $f'(t)$  are continuous and  $f''(t)$  is piecewise continuous on the interval  $[0, \infty)$ , and all are of exponential order, i.e. both of order  $e^{\alpha x}$ , then (10 marks)

$$\mathcal{L}\{f''(t)\} = s^2 F(s) - sf(0) - f'(0).$$

(b) Show that  $\mathcal{L}\{f(at)\} = \frac{1}{a}\mathcal{L}\{f(t)\}$ , where  $a > 0$  is a constant number. (10 marks)

8. (a) Find the Laplace transform of the function  $f(t) = \cos kt$ , where  $k$  is constant. (10 marks)

(b) Calculate the Laplace transform of the function  $f(t) = t^3$ . (10 marks)





# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

Subject: Physics II  
PAPER: III / PHYS-203

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 75

Question 1 is compulsory. Attempt any three questions from the remaining.

1 (a) Define any 6 of the following terms  
Refraction, Entropy, Ideal gas, Photon, Bulk modulus, electrical conductivity, shear strain, Reflection coefficient, seismic source 2\*6

1 (b) Write short answer of any 6 questions. 2\*6

- I. Differentiate between volumetric stress and longitudinal stress
- II. Differentiate between isochoric and isobaric process
- III. Differentiate between force and stress?
- IV. Differentiate between volumetric heat capacity and specific heat capacity
- V. Differentiate between active and passive methods?
- VI. Why electrical resistivity of sedimentary rocks is lower than of igneous rocks?
- VII. Write two applications of seismic reflection method.
- VIII. Why electrical resistivity method is more recommendable for groundwater investigations?

2(a) Differentiate between stress and strain. What is elasticity? Write down the applications of seismic methods in Geology and Geophysics? 2+3+4

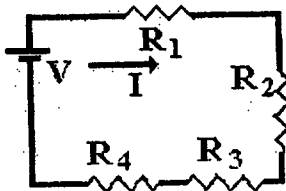
2(b) Justify following statements for an isothermal process 8  
A  $\Delta U=0$ . B  $\Delta Q=\Delta W$ . C  $PV=\text{constant}$

3(a) Write a brief note on wave interference? Describe its types. Elaborate your answer with appropriate diagrams. What is the significance of interference in our daily life? 4+3+1+4+1

3(b) Why seismic reflection method is recommendable for deep subsurface exploration? Write down the principle of seismic reflection. 2+2

4(a) Discuss in detail electrical resistivity method 9

4(b) The current flowing in a circuit containing four resistors connected in series is  $I = 1.0$  A. The potential drops across the first, second and third resistors are, respectively:  $V = 5$  V,  $V = 8$  V and  $V = 7$  V. The equivalent resistance of the circuit is  $R = 30$ . Find the total voltage supplied by the battery and also current, voltage drop, and resistance of each resistor in the circuit. 8



5 What do you mean by radioactivity? How many types of radiations exist in nature? Write down the characteristics of each type? What are the significance and uses of radioactivity in Geology and Geophysics? 17

6(a) What is the principle of Self-potential method? Write down its types and application. 2+3+5

6(b) A saxophone is playing a steady note of frequency 321 Hz at room temperature. Suppose that at some instant the varying pressure at your eardrum is at a maximum. How far away in meters is the next pressure maximum? 7



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018

Examination:- B.S. Applied Geology

Roll No. ....

Subject: Chemistry II  
PAPER: IV / CHEM-203

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 75

**NOTE: Attempt any FIVE questions. All questions carry equal marks.**

Sr #	Question	Marks
1	What is 2 <sup>nd</sup> law of thermodynamics? Define Entropy and explain entropy change in reversible and irreversible processes	15
2	a) What types of stationary phases are used in GC? b) What types of transitions are encountered in molecule? c) Explain Kyanite-andalusite and sillimanite system.	5 5 5
3	a) What is the principle of Atomic Emission Spectroscopy? Draw the block diagram and explain the working of Monochromator. b) Explain the working of Thermal conductivity detector .	10 5
4	a) What is radioactivity? How Radiations are measured? Explain any two methods b) Discuss the Principle of Mass Spectrometry	12 3
5	a) What is the function of Flame in Atomic Emission Spectroscopy? Explain it. b) What are radioisotopes give its applications.	7 8
6	a) What is Beers Lambert Law? Derive and Expression for it. b) Differentiate between I. Chromophore and auxochrome II. Bathochromic effect and hyperchromic effect III. Transmittance and Absorbance IV. Lamda max and molar absorbtivity	7 8
7	Prove that : $C_p - C_v = R$	15
8	a) What are the applications of AAS,AES, and UV-Visible Spectroscopy b) What is Nuclear fission process ,explain with examples	9 6



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

Subject: Stratigraphy of Pakistan  
PAPER: V / GEOL-209

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 75

**NOTE: Attempt any FIVE questions. All questions carry equal marks. Draw figures where necessary.**

Q.1. What are Sedimentary Basins? Explain their different types?

Q.2. Describe the stratigraphy of Nammal Gorge?

Q.3. Explain the Paleocene system of Northern Pakistan?

Q.4. Explain the Permian system of Pakistan?

Q.5. Write notes on the following:

- i). Datta Formation
- ii). Hangu Formation
- iii). Mianwali Formation

Q.6. What is stratigraphic correlation? Explain its different types?

Q.7. Briefly explain the followings:

- i). Shrinab Formation
- ii). Parh Limestone
- iii). Lockhart Limestone

Q.8. What are the different branches of Stratigraphy? Explain the lithostratigraphy and Biostratigraphy in detail?



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018

Examination:- B.S. Applied Geology

Roll No. ....

Subject: Computing & Geostatistics  
PAPER: VI / COMP-201

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 50

**NOTE: Attempt any THREE questions while Question No. 1 is Compulsory.**

- 1 (a) Define any FIVE terms and also give examples or diagrammatic representation? 2\*5  
Ordinal scale, Uniform Resource Locator, Standard error, Median, Probabilistic approach, Statistical population, Web site
- 1 (b) Give the short answers of any FIVE questions and also draw figures where it is necessary? 2\*5
- What is the secret behind the Web and also write down its drawbacks?
  - What is the difference between mathematics and statistics?
  - What is the difference between internet and web?
  - How the concept of data sampling in statistics is important?
  - Who invented the web and what was the objective behind its invention?
  - What is the difference between simple bar charts and multiple bar charts?
  - Write the difference between quartiles, deciles and percentiles?
- 2(a) Discuss the role of computer applications for geologists? 5
- 2(b) How geostatistics works and describe its applications in reservoir characterization? 5
- 2(c) Describe the various methods used to collect the primary and secondary data in statistics? 5
- 3(a) Describe the various 1D interpolation methods used to interpolate the geological data and how statistics help us in this regard? 7.5
- 3(b) Write a comprehensive note on Charles Babbage 'Analytical Engine' and its specifications. Also discuss the role of Ada - Countess of Lovelace in the designing of Analytical Engine? 7.5
- 4(a) What is the normal or Gaussian distribution curve? Write a detail note on normal distribution curve and also discuss its mathematics? 7.5
- 4(b) Discuss in detail the impact of web on following: 7.5
- Internet Browsers
  - Web Search Engines
  - World Wide Web



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

Subject: Survey & Mapping Techniques  
PAPER: VII / SURV-201

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 50

**NOTE: Attempt any THREE questions.**

Q. 1. A) Explain the different types of maps on the basis of cultural features and how we give a number to a top sheet. (7,5,5)

B) Write down the differences between the Gamma Ray Log and Resistivity Log.

C) Define the followings

I) Scale II) Adit III) Cartography IV) Horizontal equivalent V) Hade of a fault

Q. 2. A) What are the different geological structures related to the Tunnel alignments? (6,6,5)

B) Explain uses of contours.

C) What are the different types of drillings and where we prefer these types?

Q.3. A) Briefly explain the role of mapping in different fields of geology. (5,6,6)

B) How the parallels and meridians appear on the globe.

C) Explain the different types of scale.

Q.4. A) Plot the following Geological features with the help of contour (6,5,6)

I) undulating slope II) Plateau III) Cliff VI) Water Fall V) V shaped valley VI) Gorge

B) What are the different applications of total station?

C) Explain the Litho correlation.

Q.5. A) What are the basis steps in the setting up the plane table survey. (6,5,6)

B) Advantages and disadvantages of GPS.

C) I) Find out the R.F of the map which is drawn to the scale 4cm to 2 km.

II) Find out the statement of the scale if the distance between two points on the map is 1.25 cm. The distance between same two points on the ground is 2.5 km.



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

Subject: Petrology  
PAPER: VIII / GEOL-210

TIME ALLOWED: 3 Hrs.  
MAX. MARKS: 75

**NOTE: Attempt any THREE questions. Be brief and to the point and draw the sketches where needed.**

Q. 1.

- Discuss the classification of the rocks upon the base of the Silica content. 10
- Discuss chemical variation diagrams and their uses in categorizing magma type 8
- Briefly discuss the Burial Metamorphism 7

Q. 2.

- Illustrate the two component phase diagram with complete solid solution series 10
- What is the protolith of Phyllite, greenstone and marble? What processes produce the outcrop of blueschist at the surface of the earth? 7
- Discuss the Classification for Pyroclastic Rocks upon the base of particle size. 8

Q. 3.

- Enlist the major textural classes of the igneous rocks. 10
- Discuss the Dunham Classification of the Carbonate Rocks 10
- Discuss the Plastic Intracrystalline Deformation textures in Metamorphic rocks 5

Q. 4.

- Discuss the Classification of Rudites 8
- What tectonic processes produce outcrops of ophiolite at the earth's surface. Also discuss its composition and structure. 12
- Discuss the Genetic Implications of the Sandstone Composition 5

Q. 5.

- Briefly discuss the Basaltic Andesitic and Rhyolitic magma 12
- Discuss the color variation in mud rocks. 6
- Briefly discuss the Ocean Floor Metamorphism 7



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

**Subject: Nuclear Geology**  
**PAPER: IX / GEOL-211**

**TIME ALLOWED: 3 Hrs.**  
**MAX. MARKS: 75**

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***NOTE: Attempt any FIVE questions. All questions carry equal marks.***

- Q.1. Write down the physical and chemical properties of uranium
- Q.2. What is meant by artificial radioactivity? Discuss uses of stable isotopes.
- Q.3. What is carbon dating? Discuss its uses for dating of various materials.
- Q.4. Explain K/Ar dating method in detail along with its applications and limitations.
- Q.5. What is U-Pb dating technique? Discuss its principal and application in geology.
- Q.6. Discuss the occurrence of uranium in pegmatites.
- Q.7. Describe in detail the mode of occurrence of uranium in Pakistan.
- Q.8. What are Placer deposits? Discuss the prospects of uranium minerals in these deposits.



# UNIVERSITY OF THE PUNJAB

Second Prof. A/2018  
Examination:- B.S. Applied Geology

Roll No. ....

**Subject: Structural/Petroleum Geology**  
**PAPER: X / GEOL-212**

**TIME ALLOWED: 3 Hrs.**  
**MAX. MARKS: 75**

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***NOTE: Attempt any THREE questions selecting ONE question from each Part.  
All questions carry equal marks.***

## *Part-I*

- Q. 1 What are faults? Explain its components and types.
- Q. 2 What are folds? Discuss Ramsey classification of folded layers.
- Q. 3 Describe the followings:
- What are synthetic and antithetic faults?
  - What are Horst and Graben structures?
  - What is role over anticline?

## *Part-II*

- Q. 4 What are hydrocarbon traps? Discuss different types of traps-
- Q. 5 What is a reservoir rock? Define its physical properties.
- Q. 6 Discuss kerogen and its types.