UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B.Tech. (Mining Engineering) **Semester – 3**
Subject (Course): Introduction to Geology **Max. Marks : 100**
Course Code: PEGS2013 **Duration : 3 Hrs.**
No. of page/s: 5

Section A [5X4=20 Marks] - Attempt all four questions

1. Give a brief account of the Earth's interior.
2. What is the difference between weathering and erosion? Explain Physical Weathering.
3. Explain the lithological cross section of the Western Himalaya.
4. Classify folds and faults in rocks.
5. Describe Seismic waves and its types.

Section B [5X12=60 Marks] - Attempt All Five Questions

6. What is the unconformity? Explain its type with diagrams.
7. Explain the work of a river and describe the various erosional and depositional landforms created by a river.
8. Draw schematic cross-section of plate tectonics with short explanation.
9. Explain intrusive landforms with diagram and classified Igneous rocks.
10. **Solve the multiple choice questions (Select the correct answer)** **(4x3)**

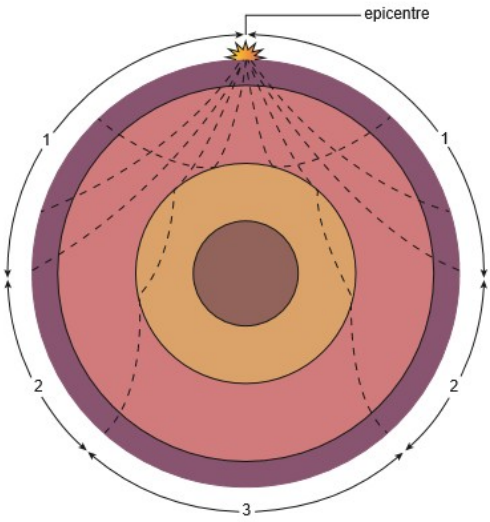
(I). Which one of the following correctly identifies the state and composition of the Earth's inner core?

	State	Composition
a	liquid	iron and silica
b	solid	iron and nickel
c	liquid	iron and nickel
d	solid	iron and silica

(II) The major effect of a large explosive volcanic eruption on the climate is:

a. cooling, due to ash particles reducing incoming solar radiation.
b. warming, due to heat from magma rising through the Earth's crust.
c. warming, due to heat from widespread lava flows entering the atmosphere.
d. warming, due to greenhouse gases entering the atmosphere.

(III) Refer to the diagram below, which shows a cross-section through the Earth. The dotted lines indicate the paths of seismic waves through the Earth and the numbers indicate three zones on the Earth's surface:



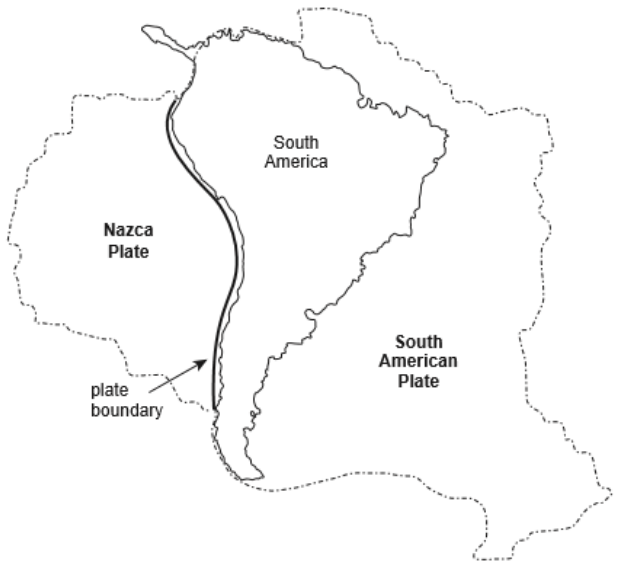
Source: Adapted from Clark, IF & Cook, BJ 1983, *Perspectives of the Earth*, Australian Academy of Science, Canberra, p 364

Which one of the following correctly identifies the seismic waves recorded by seismometers in zones 1, 2, and 3?

	Zone 1	**Zone 2**	**Zone 3**
a.	P-waves and S-waves	No waves	P-waves only
b.	P-waves and S-waves	P-waves only	S-waves only
c.	P-waves only	S-waves and L-waves	P-waves and S-waves
d.	S-waves and L-waves	No waves	S-waves only

SECTION C [Attempt only one Question=20 Marks]

11. Earthquakes regularly occur at the boundary between the Nazca Plate and the South American Plate, which is shown in the diagram below:



[*This diagram is not drawn to scale.*]

Source: Based on Clark, IF & Cook, BJ 1983, *Perspectives of the Earth*, Australian Academy of Science, Canberra, p 463

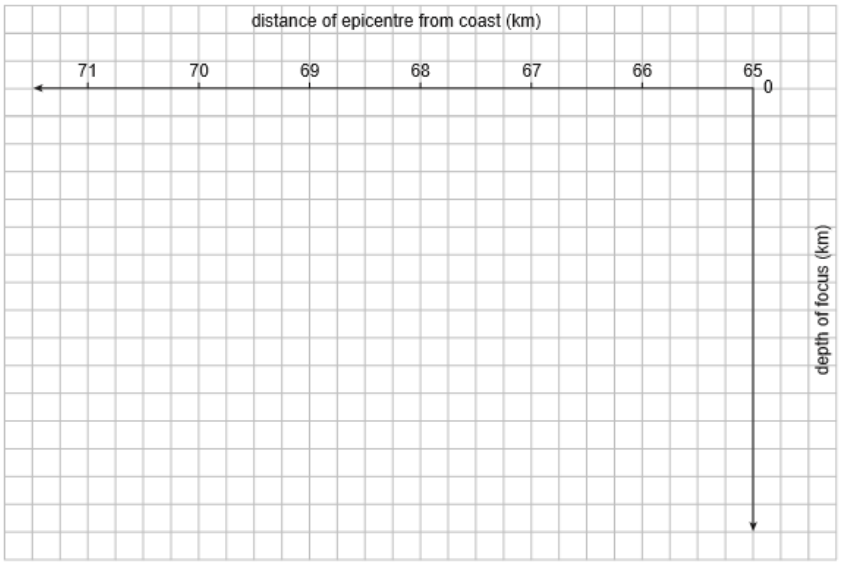
Data from eight earthquakes that have occurred at the boundary are shown in the table below:

Distance of epicentre from coast of South America (km)	*Depth of focus (km)*
70.5	17
70.0	62
69.0	101
68.5	134
68.0	147
67.0	218
66.5	225
66.0	256

Source: Data from Rapid Earthquake Viewer (REV), viewed 4 August 2016, (http://rev.seis.sc.edu/stations.html)

Refer to the diagram and table on page 16 to answer the following questions.

(a) On the grid below, complete the scale on the depth axis, plot the data from the table, and draw an appropriate line graph.



(b) The completed graph in part (a) represents a cross-section of the plate boundary. On the cross-section, mark:

(i) the locations of the Nazca Plate and the South American Plate. (1 mark)

(ii) an arrow to indicate the direction in which the Nazca Plate is moving. (1 mark)

(c) (i) State the type of plate boundary represented by this cross-section.

(ii) Use evidence from the cross-section to explain your answer to part (c)(i).

(d) Consider a section of the crust on the ocean floor at the plate boundary.

(i) Estimate the distance, in kilometers, that this section of the crust is likely to have moved after 3 million years. Show your calculation.

(ii) Suggest one way in which this section of the crust is likely to have changed as a result of this movement.

Or

Scientists have often applied geological principles to interpret photographs from other planets, particularly in the search for evidence of water and life. Refer to photograph A and photograph B and answer the questions that follow:

Photograph A: Earth

Photograph B: Mars

Source: Adapted from NASA/JPL-Caltech/MSSS and PSI 2012, 'Rock Outcrops On Mars and Earth', viewed 4 August 2016, www.nasa.gov

(a) (i) Name the rock shown in photograph A.

(ii) Suggest the most likely transporting agent of the clasts in this rock.

(iii) Describe the evidence in this photograph that supports your answer to part (a)(ii).

(b) (i) Suggest the most likely transporting agent of the clasts in the rock shown in photograph B, and give a reason for your answer.

(ii) Name the geological principle that you used when answering part (b)(i).

(iii) Describe one limitation of applying this geological principle in this case.

(c) State one reason why the search for life on Mars has been closely associated with a search for evidence of water on Mars.