

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2012  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER for GEOLOGY**

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<b>Date</b>	: 14 October 2012
<b>Total Marks</b>	: 100
<b>Examination Time</b>	: 150 minutes (2.5 hours)
<b>Reading Time</b>	: 15 Minutes (prior to examination time)

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**READ THE FOLLOWING INSTRUCTIONS CAREFULLY:**

1. Write your Roll Number clearly on the Answer Booklet in the space provided.
2. The first 15 minutes is being provided to check the number of pages, printing errors, clarify doubts and to read the instructions. You are NOT PERMITTED TO WRITE during this time.
3. Use either Blue or Black ink pen or ball point pen for the written part and Pencils for the sketches and drawings.
4. All answers should be written on the Answer Booklet provided. Candidates are not allowed to write anything on the question paper or any other materials.
5. All answers must be labeled with appropriate question numbers (Section, Question and sub-Question Numbers wherever applicable). Unlabelled answers will not be assessed.
6. This paper is divided into two sections-namely SECTION A and SECTION B.
7. SECTION A consists of two parts: Part I and Part II.

Part I consists of 30 Multiple-Choice Questions carrying one (1) mark each and is compulsory. The answer of your choice should be clearly written in whole along with the question and option number on your answer booklet. Eg. 31(c).

Part II consists of four (4) short answer questions of five (5) marks each and all questions are compulsory.

8. SECTION B consists of two Case Studies. Choose only ONE case study and answer the questions under your choice. Each case study carries fifty (50) marks in total.
9. This Paper consists of NINE (9) pages including this Instruction page.

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**SECTION A**

**PART I - Multiple Choice Questions**

Choose the correct answer and write down the letter of the correct answer chosen in the Answer Sheet against the question number. E.g. 31 (c). Each question carries ONE mark.

1. Polymorphism in minerals means:

- a) same chemical formula but different crystal structures
- b) same crystal structure but different chemical formulas
- c) biotite, muscovite, and phlogopite
- d) none of the above

2. Fossiliferous limestone is a:

- a) sedimentary rock
- b) igneous rock
- c) metamorphic rock
- d) none of the above

3. Ophiolites are pieces of:

- a) continental crust
- b) oceanic crust
- c) island arc
- d) none of the above

4. In the northern hemisphere, morning shadows point to the west direction while shadows right before the sunset point to the east direction. At noon, shadows will point:

- a) south
- b) north
- c) do not point in any direction
- d) none of the above

5. The average thickness of an oceanic crust is:

- a) 10 km
- b) 20 km
- c) 30 km
- d) 40 km

6. Gneiss is a textural term that indicates:

- a) low temperature metamorphism
- b) rocks experienced temperature high enough to segregate felsic and mafic minerals

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- c) nothing to do with metamorphism
- d) relics of sedimentary features

7. Protolith of paragneiss is:

- a) sedimentary rock
- b) igneous rock
- c) metamorphic rock
- d) none of the above

8. Foliation and lineation are examples of:

- a) rock fabrics
- b) sedimentary structure
- c) igneous texture
- d) metamorphic reaction texture

9. According to the law of original horizontality:

- a) sedimentary rocks form horizontal or near horizontal layers
- b) sedimentary rocks do not form horizontal or near horizontal layers
- c) sedimentary rocks are inclined
- d) sedimentary rocks are bent

10. Composition zoning in minerals tell us:

- a) minerals are homogeneous
- b) multiple stages of mineral growth
- c) one stage of mineral growth
- d) none of the above

11. Good example of oceanic-continental collision is:

- a) the Himalayas
- b) the Andes
- c) Mariana trench
- d) Appalachian mountains

12. The statement "The summit of Mt. Everest is marine limestone" tells us that:

- a) Mt. Everest was once under the sea
- b) Mt. Everest was never under the sea
- c) Mt. Everest was always at its elevation
- d) none of the above



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13. Joints and faults are distinguished by:

- a) offset
- b) veins
- c) folds
- d) none of the above

14. In a strike-slip fault, the hanging wall:

- a) moves horizontally relative to the foot wall
- b) moves downwards relative to the foot wall
- c) does not move relative to the foot wall
- d) none of the above

15. The correct order of ages (oldest-youngest) in geologic time scale is:

- a) Devonian, Silurian, Ordovician, Cambrian
- b) Cambrian, Ordovician, Silurian, Devonian
- c) Permian, Carboniferous, Devonian, Silurian
- d) Silurian, Devonian, Ordovician, Cambrian

16.  $\text{CaMg}(\text{CO}_3)_2$  is a chemical formula for the mineral:

- a) gypsum
- b) talc
- c) dolomite
- d) limestone

17. Key factors determining metamorphism are:

- a) pressure and temperature
- b) grain size and crystal structure
- c) pressure, temperature, and composition
- d) none of the above

18. The term foliation is applied to a:

- a) sedimentary rock
- b) metamorphic rock
- c) igneous rock
- d) none of the above

19. The softest mineral is:

- a) calcite
- b) talc

