



**UNIVERSITY EXAMINATIONS**  
**FOURTH YEAR EXAMINATION FOR THE AWARD OF THE**  
**DEGREE OF BACHELOR OF SCIENCE**  
**SECOND SEMESTER 2022/2023**  
**[JANUARY-APRIL, 2023]**

**BSMN 423: IGNEOUS PETROGENESIS**

**STREAM: Y4S2**

**TIME: 2 HOURS**

**DAY: FRIDAY, 9:00 – 11:00 AM**

**DATE: 31/03/2023**

**INSTRUCTIONS**

- 1. Do not write anything on this question paper.**
- 2. Answer question ONE and any other TWO questions.**

**Q1:**

- a) Define igneous petrogenesis (2marks)
- b) Petrogenesis is comprised of three main stages. State and briefly discuss the three stages. (12marks)
- c) Classify igneous rocks on the following basis (9marks)

Mode of formation	textures	Mineralogy and composition	Silica content

- d) Explain the meaning of the following terms (5marks)
  - i) Petrogenic provinces
  - ii) Volcanic chains

- iii) Island arcs
- iv) Ophiolites
- v) Hot spots
- e) Define a magma reservoir (2marks)

**Q2**

- a) State four environments for magma formation (4marks)
- b) State three factors that affect the fluidity of magma (3marks)
- c) State and explain three origins of magma (6marks)
- d) Differentiate between primary melts and parental melts as used in evolution of magma (2marks)
- e) Briefly describe the concept of migration of magma (5marks)

**Q3**

- a) What is a Petrogenic province (2marks)
- b) Define the following as used in Petrogenic provinces (6marks)
  - i) Basaltic provinces
  - ii) Granite-granodiorite provinces
  - iii) Mafic-utramafic complexes
- c) Describe, using a table, the following in terms of silica content, viscosity, eruptive behavior and distribution (can use a table) (12marks)
  - i) Ultramafic
  - ii) Mafic
  - iii) Andesitic
  - iv) felsic

**Q4**

- a) What is magmatic differentiation (2marks)
- b) Briefly describe the following magmatic pipes (6marks)
  - i) Dykes
  - ii) Sills
  - iii) Plutons
- c) Distinguish between convergent plate margins and divergent plate margins (4marks)
- d) Highlight on the following magmatic geosystems (8marks)
  - i) Island arc plate subduction
  - ii) Plate divergence
  - iii) Hot-spot volcanism
  - iv) Continental plate subduction

**Q5**

- a) Discuss the theories that explain formation of hotspots (4marks)
- b) Outline any four rules of plate tectonics (4marks)
- c) Outline four sources of mantle material (8marks)
- d) Distinguish between volcanic arc and a volcanic chain (4marks)