INSTRUCTIONS FOR CANDIDATES

1. This is an OPEN BOOK examination. Candidates are encouraged to fully understand the intent and scope of the questions before attempting to answer them.

2. TEN (10) questions of the candidate's choosing, out of FIFTEEN (15), constitute a complete examination paper. All questions are of equal value (10 marks each).

3. Any assumptions made in the interpretation of a question should be clearly stated in the answer.

4. The questions have been designed such that the answers can be confined to the space provided below each question. If space is insufficient, answers may be continued on the back page, showing the question number to which the answer pertains.

5. Clarity and organization of the answers, including legible handwriting, are important.

6. The use of freehand sketches and tables to augment or organize answers is encouraged.

7. Calculators are not required for this exam. However, a non-communicating calculator is permitted.

THIS EXAMINATION PAPER CONSISTS OF FIFTEEN (15) PAGES, INCLUDING THIS COVER PAGE
QUESTIONS (Answer any 10 of 15)

1) How are biofacies recognized and differentiated in the rock record?
2) Which of the two, breccia or conglomerate, is likely to be superior in engineering related characteristics (e.g., strength, compressibility)? Explain why.
3) Describe briefly, with reasons, the advantages and disadvantages of shale and dolostone with respect to the following:

3.1 Deep cut for a ground transportation corridor

3.2 Support of foundation at or below the groundwater table

3.3 Aggregate production for incorporation within a pavement structure

3.4 Tunneling
4) Using sketches (if necessary) explain:

4.1 The formation of turbidites and their significance in the geological record.

4.2 How can turbidites be distinguished from debris flow?
5) Define any five of the following terms using sketches and short descriptions as necessary: [Tick off ✓ the definitions you have selected.]

- Competency (in relation to fluvial and aeolian processes)
- Flute marks
- Loess
- Lysocline
- Milankovitch cycle
- Oolith
- Pelagic sediments
- Wacke and arenite
6) Using one paragraph for each, name and provide brief descriptions of the principles of operation of three methods that can be used to evaluate, log and understand the stratigraphic record.
7) Define Froude Number and briefly explain, citing an example, its significance in sedimentary geology.
8) Briefly describe the formation, diagenesis and physical properties of three sediments of organic origin and their uses and limitations in civil engineering applications.
9) What distinguishes clastic from non-clastic sediments? Give two examples from each class of sediment. Explain briefly their main physical characteristics and any diagenetic influences that affect them.
10) What is the origin of soil plasticity and cohesion? Explain the main factors involved.

11) Explain briefly the difference between flocculated and dispersed clays (use sketches if necessary). What makes some clay deposits sensitive (reduction in strength when disturbed)?
12) Describe karst terrain. Comment on its engineering significance and potential concerns for a proposed high dam and water storage reservoir project.
13) What physico-chemical properties distinguish carbonate from non-carbonate rocks and how do they influence strength and/or durability in engineering applications?
14) What are transgressions and regressions in sedimentary geology? Illustrate your answer with sketches if necessary.
15) Explain the cyclic nature of deltaic deposits. Draw sketches if necessary.