

National Exams: May 2016**04-Geol-A3, Sedimentation & Stratigraphy**

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a **NO CALCULATOR PERMITTED EXAM**.
3. This exam paper consists of three pages (including this cover page). There are two parts: **Part 1** (Questions 1-12) conveys questions related to Sedimentology and Sedimentary Processes whereas **Part 2** (questions 13-19) conveys questions related to Stratigraphy and sedimentary basin analysis.
4. Part 1 consists of 12 questions. Answer **eight** questions of your choice. Each question weighs 5 points. Therefore, this Part 1 has total marks 40 (8 questions X 5 = 40 points)
5. Part 2 consists of 7 questions. Answer **five** questions of your choice. Each question weighs 5 points. Therefore, this Part 2 has total marks of 25 (5 questions X 5 = 25 points).
6. **The maximum attainable grade is 65/65 (40 for Part 1, and 25 for Part 2).**
7. Most questions require an answer in essay format. Clarity and organization of the answers are important.
8. **Please note:** The first number of questions permitted to answer in each part (i.e., Part 1 & Part 2) will be marked as they appear in the answer book. Thus, don't answer more than what you were instructed to answer.

Part 1: Sedimentology

Answer any eight of the following 12 questions. 5 points each (8 X 5 = 40 points total).

- 1- Sandstones can be texturally and compositionally (mineralogically) mature. Explain these two parameters. Also explain what factors determine the maturities (both) of sandstones.
- 2- Paleocurrent directions of sandstones can give information about the depositional processes. Explain how and from where geologists collect paleocurrent data. Explain three paleocurrent patterns and the processes they represent.
- 3- Most carbonate sediments accumulate in extensive shallow marine environments known as carbonate platforms. Explain the different types of carbonate platforms. For each type of a platform, explain its energy distribution and how it affects the facies.
- 4- What are the triggers of turbidity currents and where do they occur? Explain the depositional model of turbidites.
- 5- What are the grains that form framework particles of sandstones? Which one is most useful in suggesting the source (provenance) rock of the sandstones?
- 6- What is diagenesis? State the different diagenetic stages with at least one example of diagenetic process in each stage.
- 7- A sedimentary rock with gravel-size sedimentary particles that are floating within muddy matrix is called _____
 - a. Petromictic conglomerate
 - b) diamictite
 - c) pyroclast
 - d)mylonite
- 8- Provide the classification scheme of carbonate rocks following Dunham's classification (1962) with modifications by Embry & Klovan (1972). A table format is acceptable.
- 9- What are the different types of framework grains that constitute carbonate sediments? Describe each one of them.
- 10- Describe herringbone, flaser and lenticular bedding (sketching is helpful). What depositional environment(s) do they represent?
- 11-Explain and sketch sandstone classification scheme.
- 12-Which one of the following ichnofacies (trace fossils) indicates low energy, sublittoral deposits?
 - a) *Cruziana*
 - b) *Skolithos*
 - c) *Zoophycus*
 - d) *Trypanites*

Part 2: Stratigraphy and sedimentary basin analysis.

Answer five of the following seven questions (5 points each. Total points to answer: 5 X 5 = 25)

- 13-What is the difference between conformable and unconformable stratigraphic boundaries?
Describe the different types of unconformable contacts.
- 14- Describe the following two terms: (i) lithocorrelation, and (ii) biocorrelation.
- 15-Describe the Principle (Law) of Superposition and explain how it is applicable to lithostratigraphic studies.
- 16-Define **two** of the following four terms:
- a) Taxon-range biozone b) Interval biozone c) Lineage biozone d) Assemblage biozone
- 17- Explain the term "Depositional Sequence" and the different system tracts that may constitute a sequence.
- 18- Explain the differences between eustatic and relative sea-level changes.
- 19-Which of the following basins is related to convergent tectonics?
a- Passive margin basin b- Foreland basin c- Aulacogen d- Intracratonic basin