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) diamicite  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, sublitoral 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