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UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Examination, July 2020

Programme: B. Tech GEOSCIENCE **Semester: IV**

Course Name: PETROLEUM GEOLOGY **Max. Marks: 100**

Course Code: PEGS2020 **Attempt Duration: 2 Hrs. for sect A**

No. of page/s: 08

Note:

1. Read the instruction carefully before attempting.
2. This question paper has two section, Section A and Section B.
3. There are total of seven questions in this question paper. **One** in **Section A** and **six** in **Section B**

4. **Section A** consist of multiple choice-based questions and has the total weightage of 40-50%.
5. **Section A** will be conducted online on BB Collaborate platform
6. **Section B** consist of long answer-based questions and has the total weightage of 50-60%.
7. The maximum time allocated to **Section A** is two Hrs.
8. **Section B** to be submitted within 24 hrs from the scheduled time (*exceptional provision due extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).
9. No submission of **Section B** shall be entertained after 24 Hrs.
10. **Section B** should be attempted after **Section A**
11. **The section B** should be attempted in blank white sheets (hand written) with all the details like programme, semester, course name, course code, name of the student, Sapid at the top (as in the format) and signature at the bottom (right hand side bottom corner)
12. Both section A & B should have questions from entire syllabus.
13. The COs mapping, internal choices within a section is same as earlier

SECTION A [60 MARKS]

True or False. [1x 20=20marks]

1. Crevasse Splay is Formed when river breaks natural levees and deposits sediments on floodplain
2. Open ocean basin accepts more water input, which means there is potential for greater wave energy in wave dominated delta.
3. Thermal maturity > 1% is indicative of biogenic gas zone.
4. When the TOC in shale greater than 5%, It is excellent source rock.
5. Kerogen IV type highly potential for oil.
6. Pyrolysis can be monitored by heating the samples in a stream of helium which sweeps the evolved hydrocarbons into a flame-ionisation detector
7. Gamma Cerane is high relative to C31hopanes in oils derived from sources deposited under hyper saline depositional conditions.
8. The trap where hydrocarbon is trapped due to hydrodynamic flow of the water in permeable beds is known as Structural trap.
9. API Gravity for heavy oil greater than 25.
10. Reservoir Pressure Conditions for normal when pressure gradient is greater than hydrostatic pressure.
11. Sea Level rise and fall refer to the horizontal movement of the sea surface.
12. The point of maximum curvature of a folded bed is called Limb.
13. A fault that show sidewise displacement of hanging wall is termed as Reverse Fault.
14. In the unconventional resource the clay mineral content less than 50%.
15. The effect of Diagenesis may Enhanced or Degrade Reservoir quality.
16. Reduce the Interfacial tension to increase the wettability in the reservoir.
17. Biogenic Theory fellow that oil and gas come predominantly from the remains of microscopic plants and small animal organism.
18. The study of prehistoric life including organism evolution and interaction with each other and their environments is called Paleontology.
19. Rock Thermal Conductivity is a function of porosity and depth of burial
20. Bottom hole rock temperature from well and drill stem testing

Fill in the blanks [2x10=20marks]

21. ……(Isopay/Isolith) map is prepared by obtaining difference in elevation between the gas-water contact and the top of the hydrocarbon bearing zone.
22. Inert kerogen breaks down to generate principally ……(liquid/gaseous) hydrocarbons.
23. Type I kerogens are characterized by high initial……. hydrogen-to-carbon/ carbon hydrogen ratios.
24. Kerogen is…… (soluble/insoluble) in normal organic solvents.
25. Cannel coal is a variety of fine-grained, ……. (low/ high-rank) coal with significant oxygen.
26. Homoclinal flow associated with ……..(tide/fluvial) dominated deltas.
27. ……(Barchan/star) is a curved, arc shaped sand mound with horns facing downwind formed in arid regions is called
28. ……. (maceral/kerogen/vitrinite) is fundamental constituent of humic coal.
29. Higher ratio of pristine/phytane indicates ……. (marine/terrestrial) environment.

30. Increasing C35/C34 Homohopane ratio indicates strongly …… (reducing environment

MCQ. [2X 10=20 marks]

31. Pristane/ Phytane ratio provide a measure of redox condition of deposition, when value
    (a) <1; (b) >1; (C) >3; (d) <3
32. As maturity increases, the maximum rate of Pyrolysis also increases. The temperature at which the maximum rate of hydrocarbon generation occurs, is known as
    (a) S1
    (b) S2
    (c) Tmax
    (d) HI
33. Horst and graben structures are typically formed by
    (a) normal faulting
    (b) strike-slip faulting
    (c) reverse faulting
    (d) thrust faulting
34. Turbidites commonly form in
    (a) fluvial environment
    (b) deep marine environment
    (c) tidal flat environment
    (d) beach environment
35. Which of the following is the fundamental constituent of humic coal?
    (a) Mineral matter
    (b) Maceral
    (c) Lithotype
    (d) Kerogen
36. Number of carbon atoms per molecule in lubricating oil are
    (a) 14 to 20.
    (b) 20 to 50.
    (c) 50 to 70.
    (d) Above 70
37. Which of them is used in extraction of metals (a) Coal gas, (b) Coke, (c) Coal tar, (d) Petroleum
38. Deltas which undergo strong tidal interaction - As sediment travels out of the delta into the sea, high tides and flood tides confine sediment on the delta plain and low tides carry sediment seaward, is known as (a) Tide dominated delta, (b) wave dominated delta (c) fluvial delta, (d) none
39. When the density of river water is equal to density of standing water in the basin, the flow type in a delta is known as
    (a) Homopycnal
    (b) Hyperpycnal
    (c) Hypopycnal
    (d) None
40. The main source of this type of kerogen are continental plants found in thick detrital sedimentation along continental margins.

(a) Vitrinite; (b) liptinite; (c) Kerogen type III (d) all

Section - B (Attempt all the questions) (4 × 10 =40 marks)

41. Elaborate different types of petroleum traps.
42. (a) Design a study that uses sediment texture, fossil content and sedimentary structures to infer the petroleum prospect in the depositional systems of transitional and marine sedimentary environment.
    (b) Based on the study on depositional environment, assess the suitable depositional system for source rock and reservoir development. Justify your answer.
43. Describe how to determine the biological origin (parent precursors) of organic compound found in geological strata. Why is it important?
44. Establish relationship between stereochemistry of biomarkers and paleo-strain level a sedimentary basin.

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