

Indian Institute of Technology

Date: FN/AN Time: 3 hrs. Full marks: 100

Autumn: 2003 Deptt. Geology & Geophysics

Sub. No. GG 225001 Geology of Coal & Petroleum **5th yr. Applied Geology (Integrated)**

Instruction: Answer any two from section-A and answer all the questions from section-B.

Section-A

1. Why water solution is not a good mechanism for primary migration of hydrocarbon? Explain how the effect of buoyancy and capillary pressure in a hydrostatic condition differ from those in a hydrodynamic condition during the migration of hydrocarbon. 20
2. What do you understand by isotopic fractionation? Explain why $\delta^{18}\text{O}$ - δD slope of oil field brines deviates from meteoric water line? How the carbon isotopes of petroleum and kerogen can be used for oil-oil and source rock-oil correlation? 20
3. What is the difference between gross and net pay? What is a diagenetic trap? 20
In a reservoir, water in the aquifer (resistivity ~ 1 ohm) was wrongly sampled instead of water below the oil/water contact (resistivity ~ 0.2 ohm). Considering Archie's factor = 16 and $R_t = 25$ ohm, calculate its effect on oil saturation estimation.

Section-B

4. Explain how the nature of oil-water contact depends on the hydrodynamic condition of reservoir. Briefly discuss the compositional spectrum of unsaturated hydrocarbons. 10

OR

How the roll-over anticlines are formed? Discuss about various kinds of stratigraphic traps.

5. Differentiate between any two: 10
a) Bitumen and hydrocarbon ratio d) Early and late primary migration e) Juvenile and senile basin
6. Write short notes on any two: 10
(i) Oil shale (ii) Sulfate reducing zone (iii) Carbonate porosity
7. Write explanatory notes on: 5x6 = 30
(a) Source of natural fuels (b) Coal, coal constitution and its varieties (c) Tertiary coalfields in India (d) Coal production and reserve in India (e) Peat