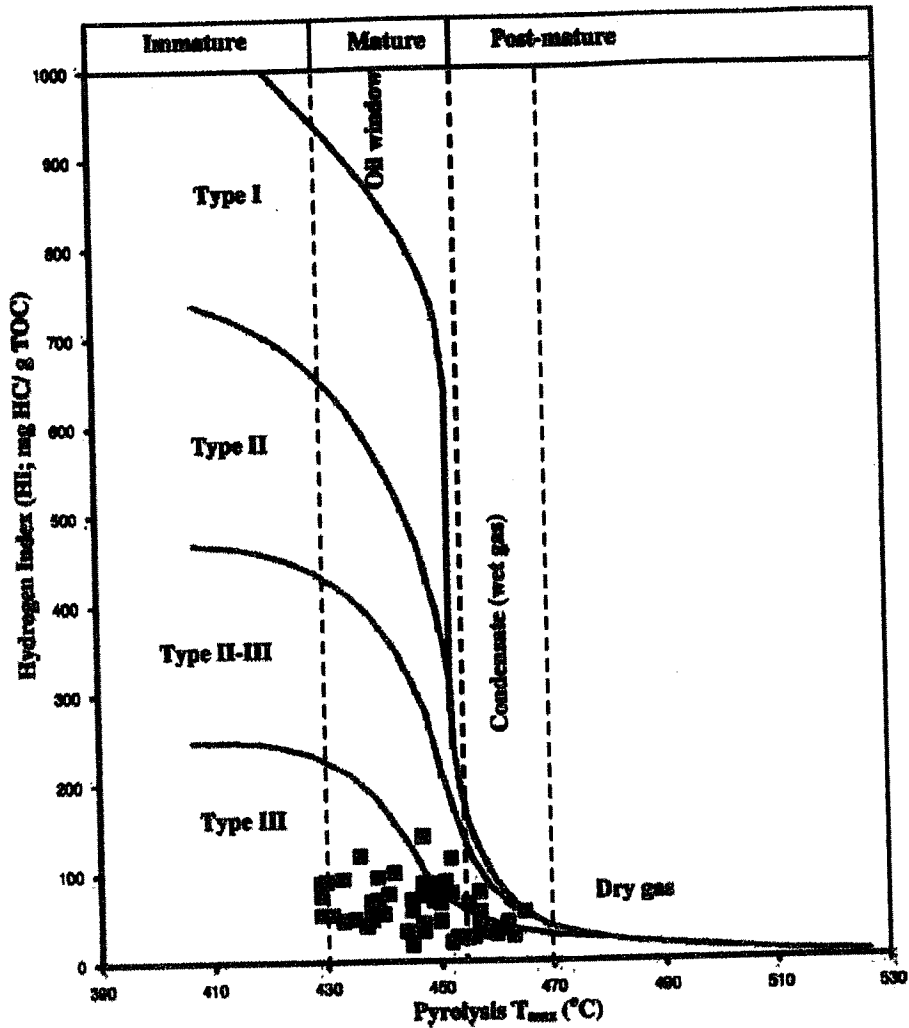




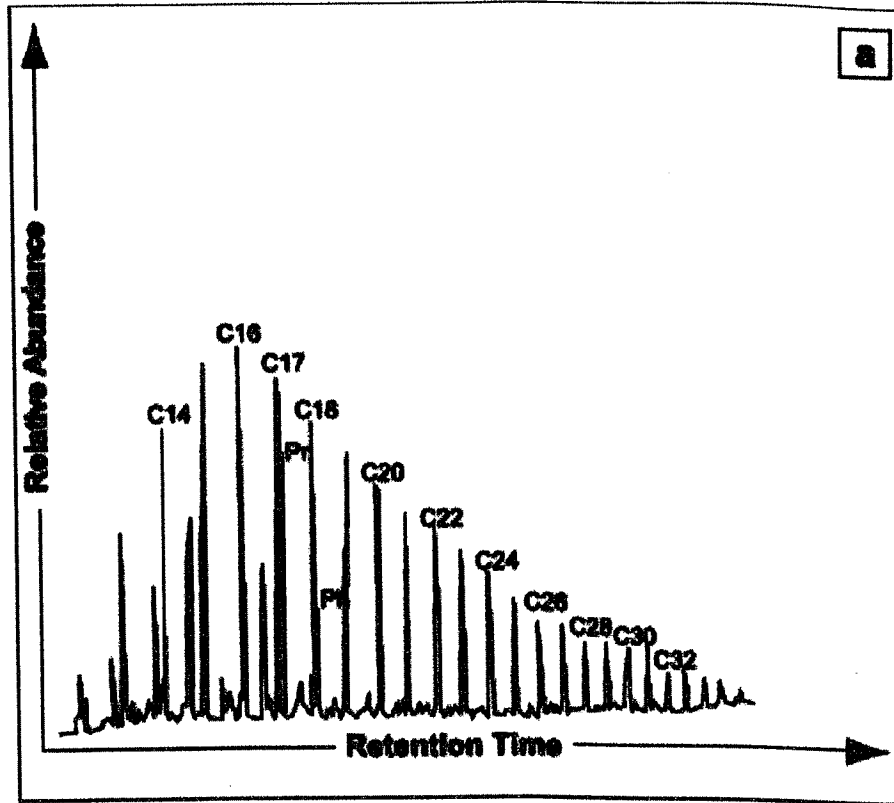
Part B

1.
  - a. Describe the formation mechanism of petroleum in detail.
  - b. Describe basic elements of exploitable petroleum system.
2. Write a detailed description on the petroleum exploration in Sri Lanka.
3. Write short notes on the following.
  - a. Primary and secondary oil recovery
  - b. Upstream petroleum industry
  - c. Service company and operators
4.
  - a. List the three (03) main petrophysical steps to evaluate the amount of hydrocarbon placed in the reservoir.
  - b. Briefly explain Radioactivity Logs (Nuclear Logs).
  - c. A newly discovered natural gas deposit has covered the area of 2,000 acres. The thickness of the deposit is 150 feet. The porosity ( $\phi$ ) and water saturation ( $W_s$ ) of the formation are 15% and 30%, respectively. The calculated oil formation volume factor ( $B_o$ ) is 1.65 (reservoir bbl per stock tank bbl). Calculate the values of (i) oil in place (OIP) and (ii) stock tank oil originally in place (STOOIP).  
**OIP = 7758 Ah $\phi$  (1-Sw) bbl**
5.
  - a. Explain the importance of (i) TOC (total organic carbon), (ii) C/N (carbon to nitrogen ratio), and C/S (carbon to sulfur ratio) in petroleum exploration.
  - b. The Upper Cretaceous Fika shales in the Chad (Bornu) Basin, northeastern Nigeria were analyzed to evaluate the origin of the organic matter and the hydrocarbon generation potential. Briefly explain the plot of hydrogen index (HI) versus pyrolysis  $T_{max}$  for the analyzed Fika shale samples.



- c. A geochemical exploration was carried out in the Chelif Basin, (western Tellian domain, north Algeria) to understand types of the hydrocarbon in the petroleum system. *n*-alkanes compositions can be used to distinguish the hydrocarbon composition of sedimentary organic matter. Short-chain *n*-alkanes (i.e., C<sub>16</sub>-C<sub>19</sub>) indicate algae organic matter. Middle- to long-chain *n*-alkanes (i.e., C<sub>20</sub>-C<sub>35</sub>) indicate vascular terrestrial plants.

Briefly explain the type of hydrocarbon based on *n*-alkanes distribution followed by Gas Chromatography-Mass Spectrometry (GC-MS) analysis.



(Total Mark 15 x 5 = 75)

